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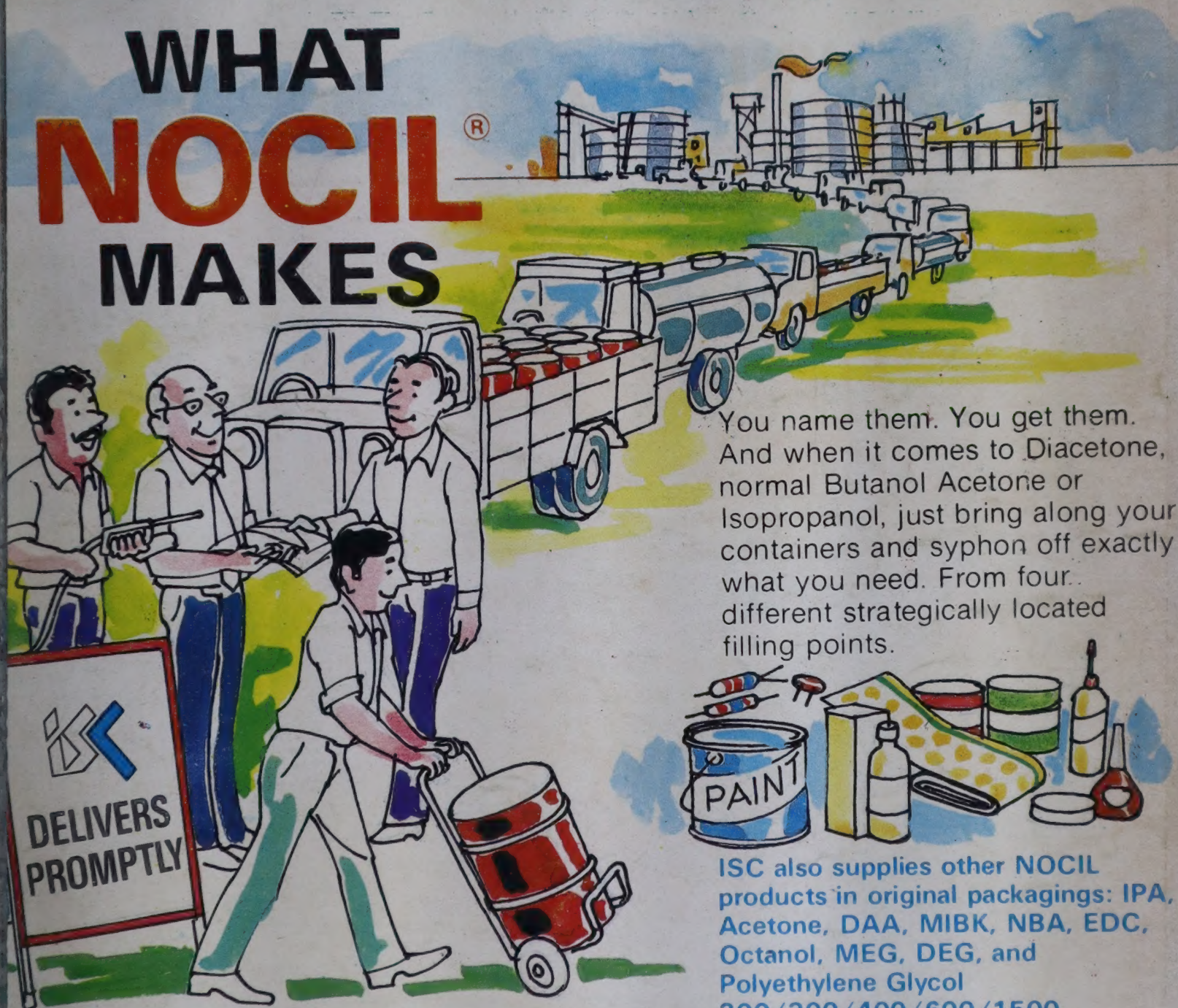
CHEMICAL WEEKLY

VOL. XXXIII

JANUARY 12, 1988

NO. 18

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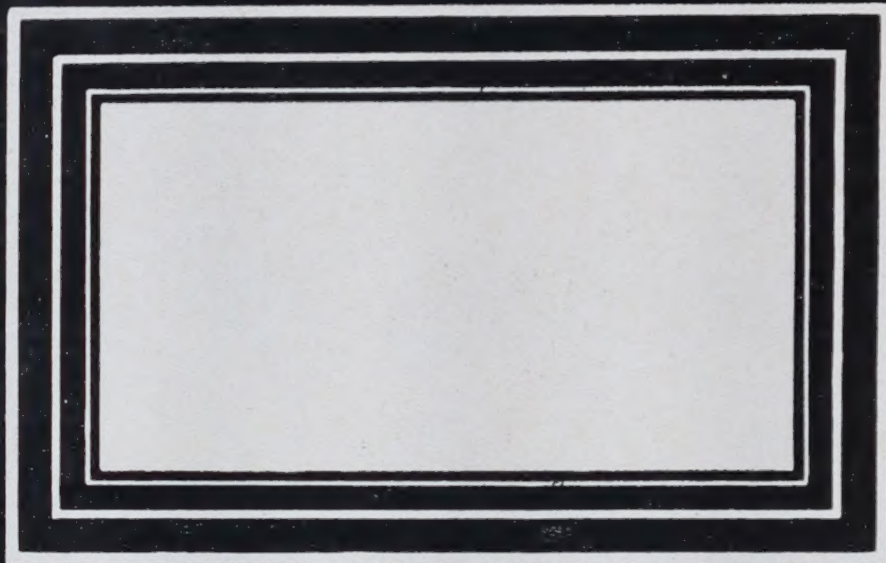
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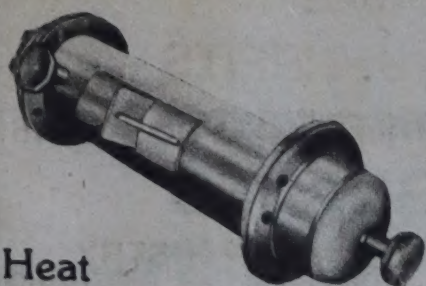
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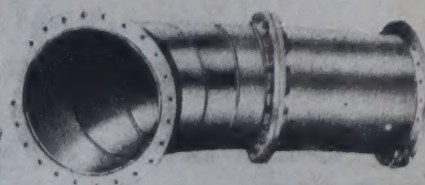
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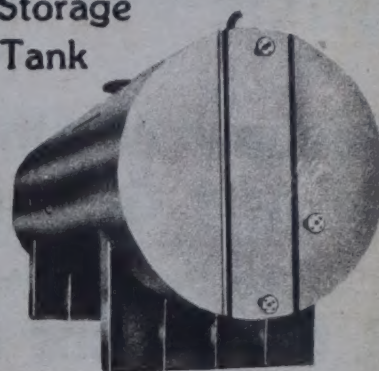


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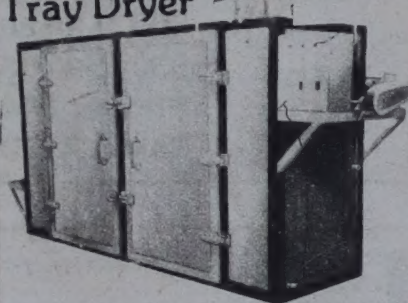
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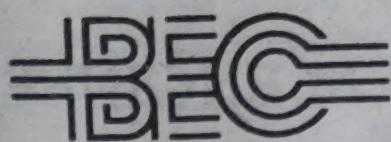


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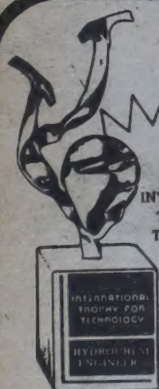
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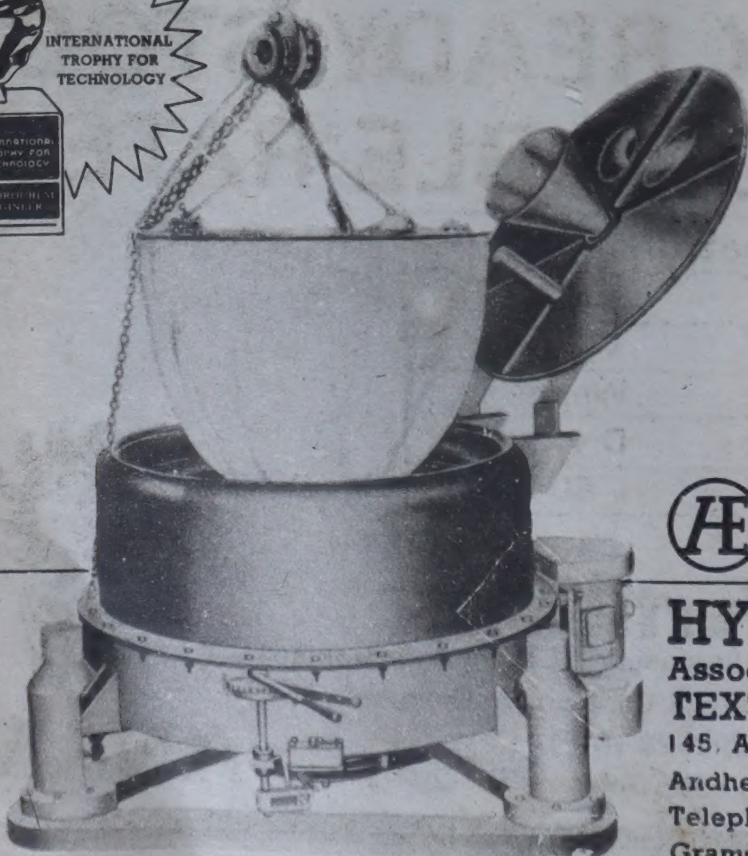


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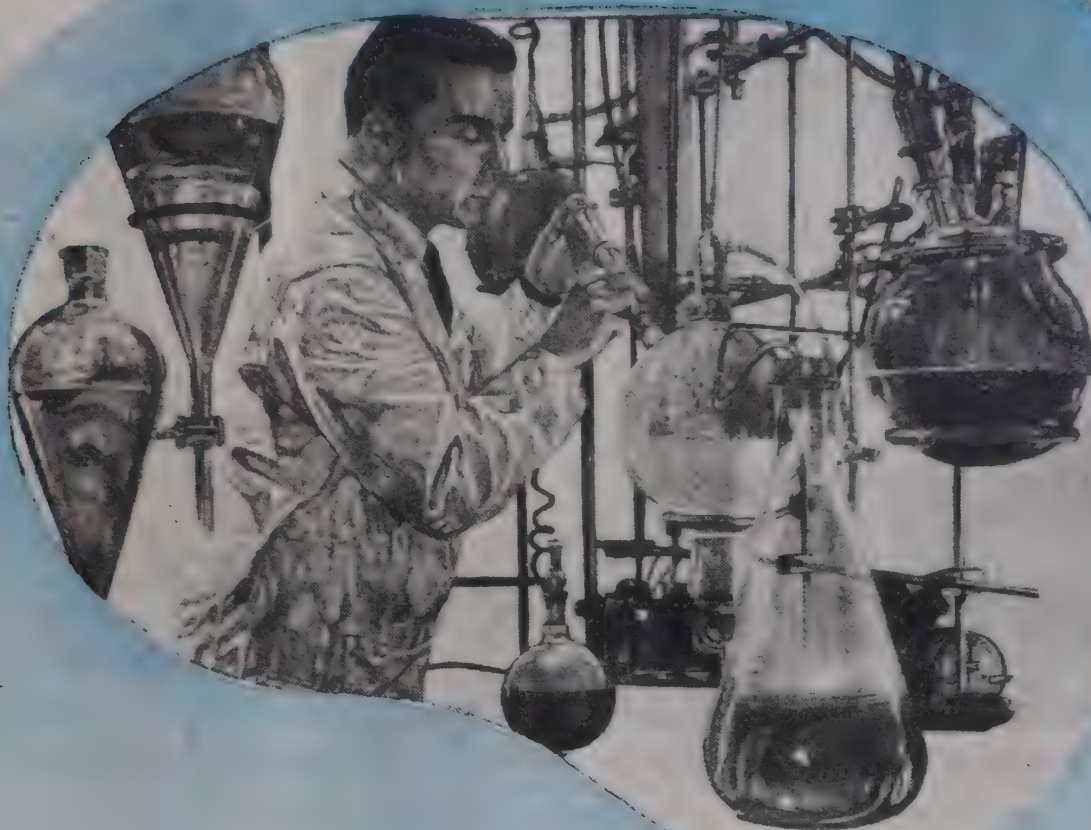
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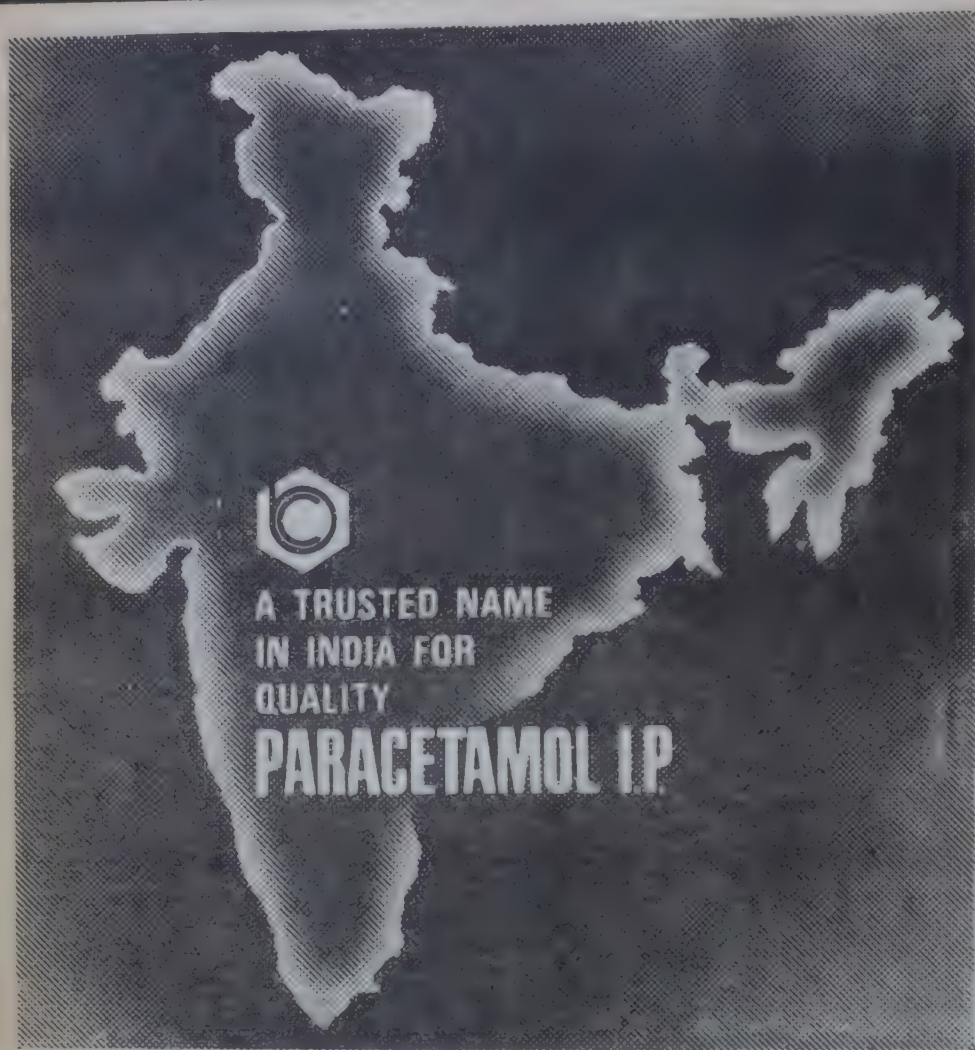
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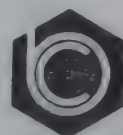
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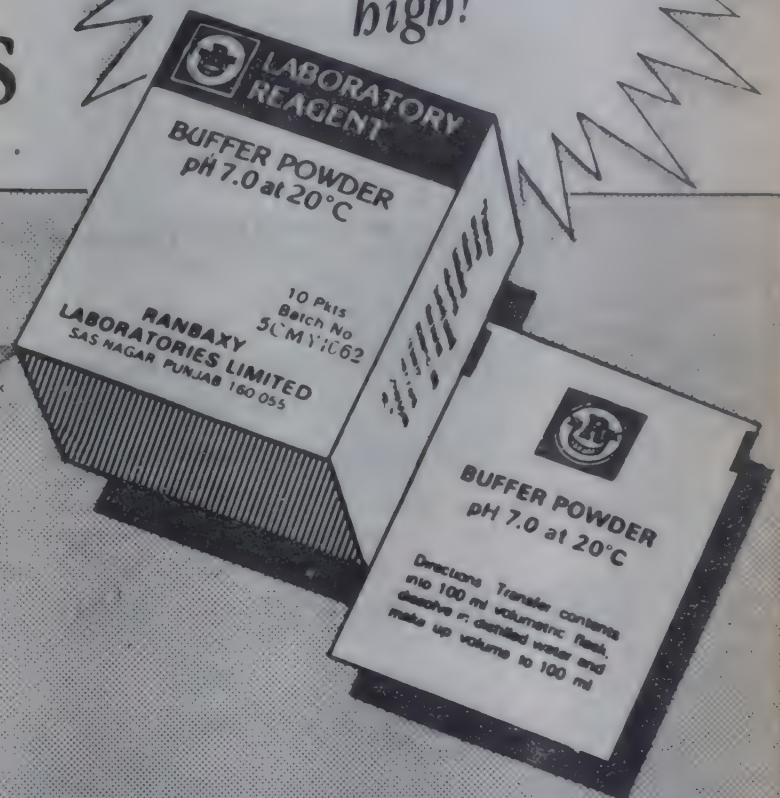
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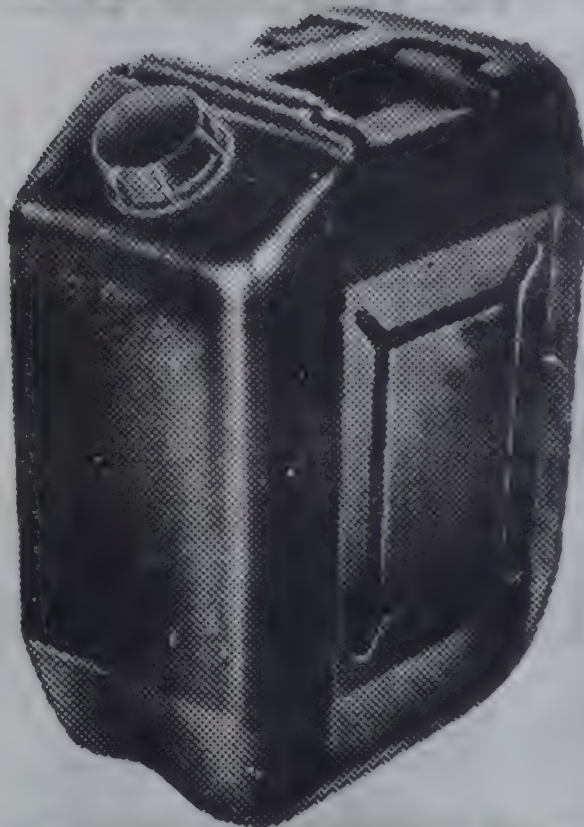
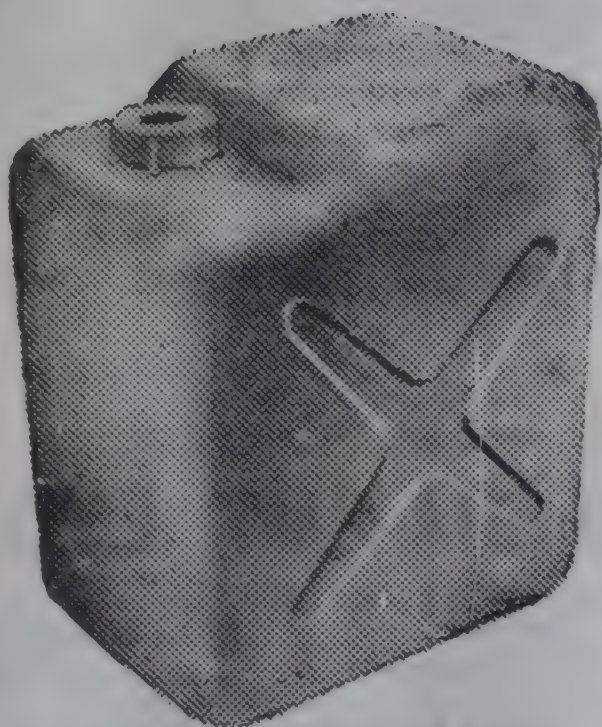
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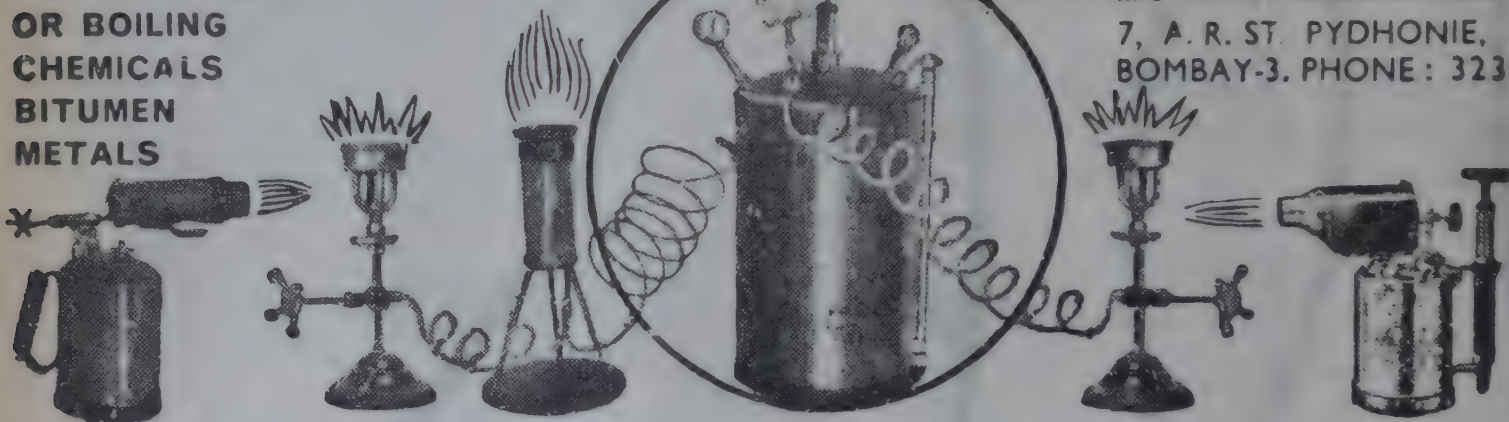
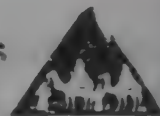
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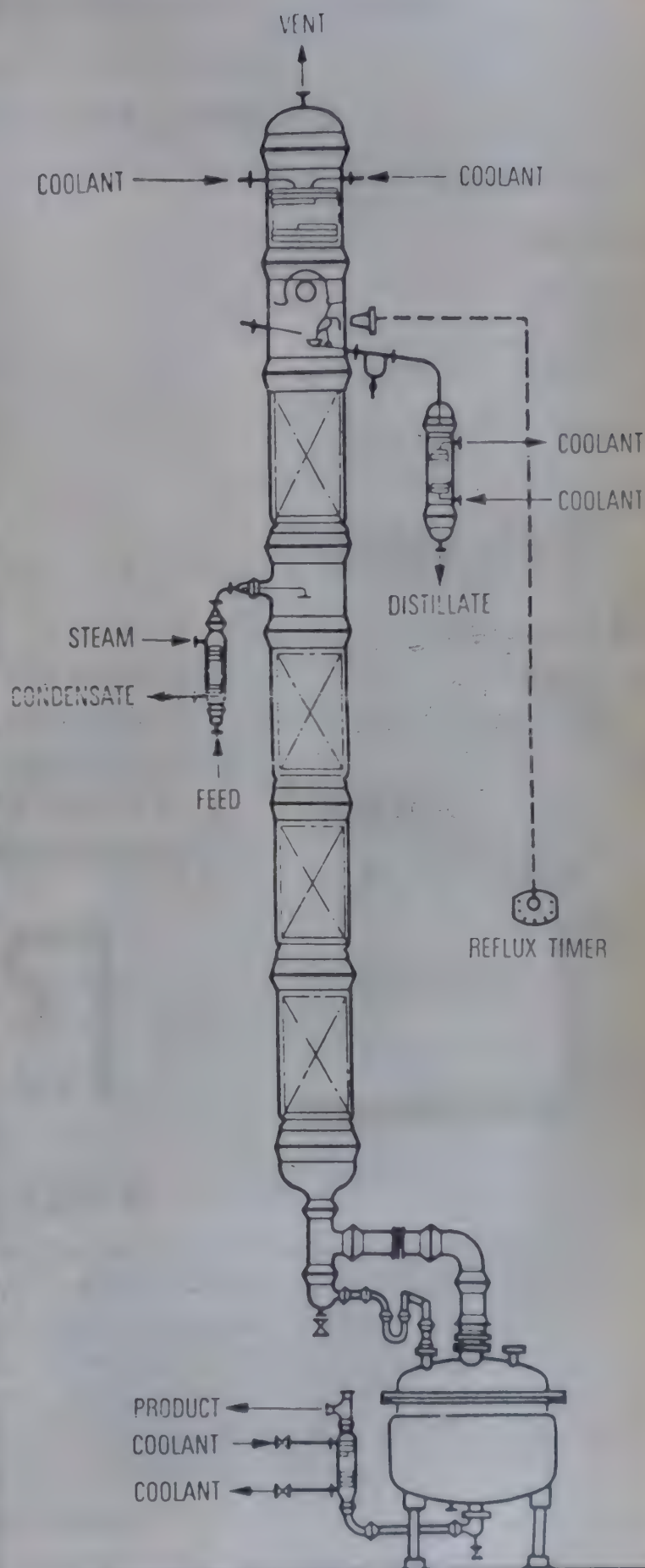
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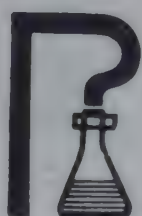


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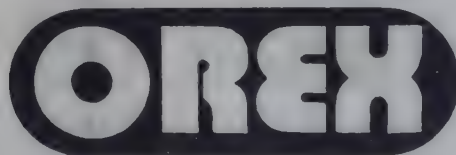
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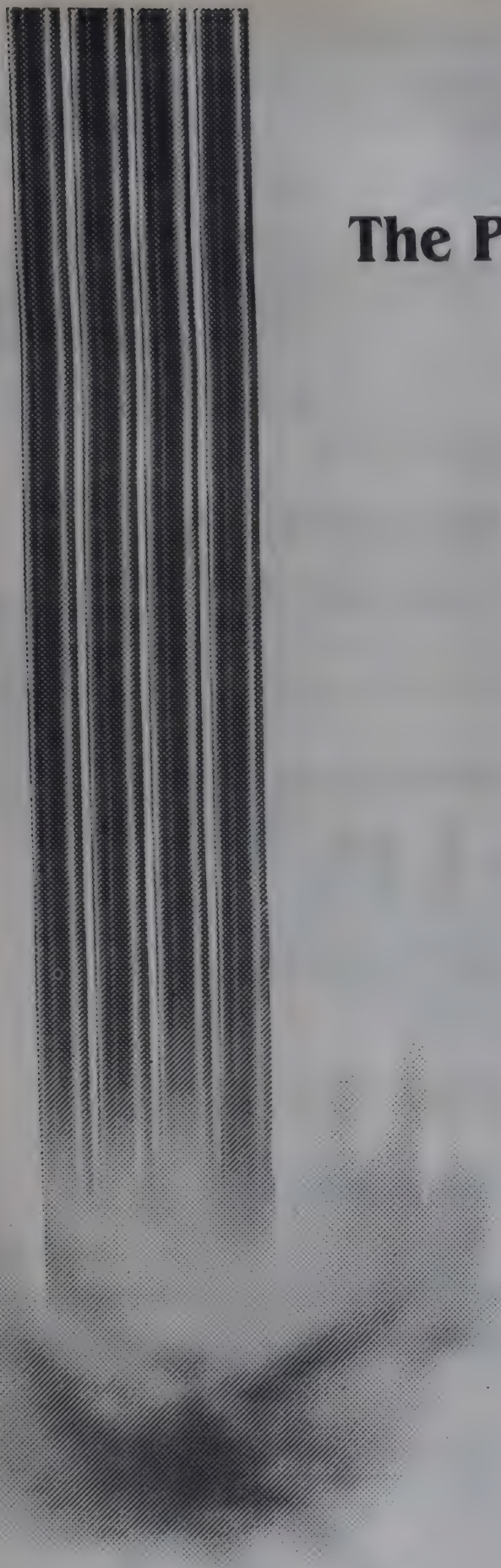
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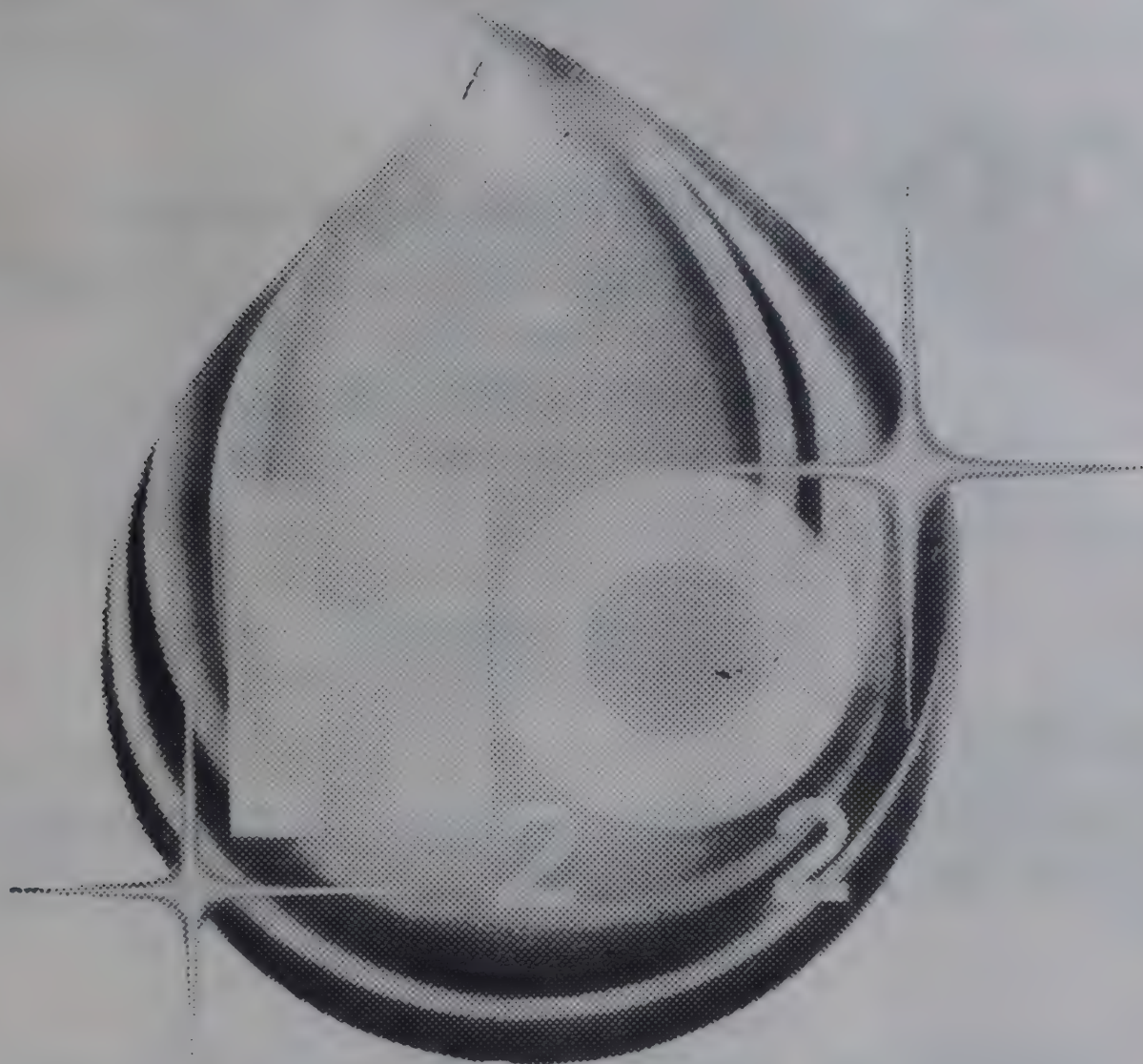


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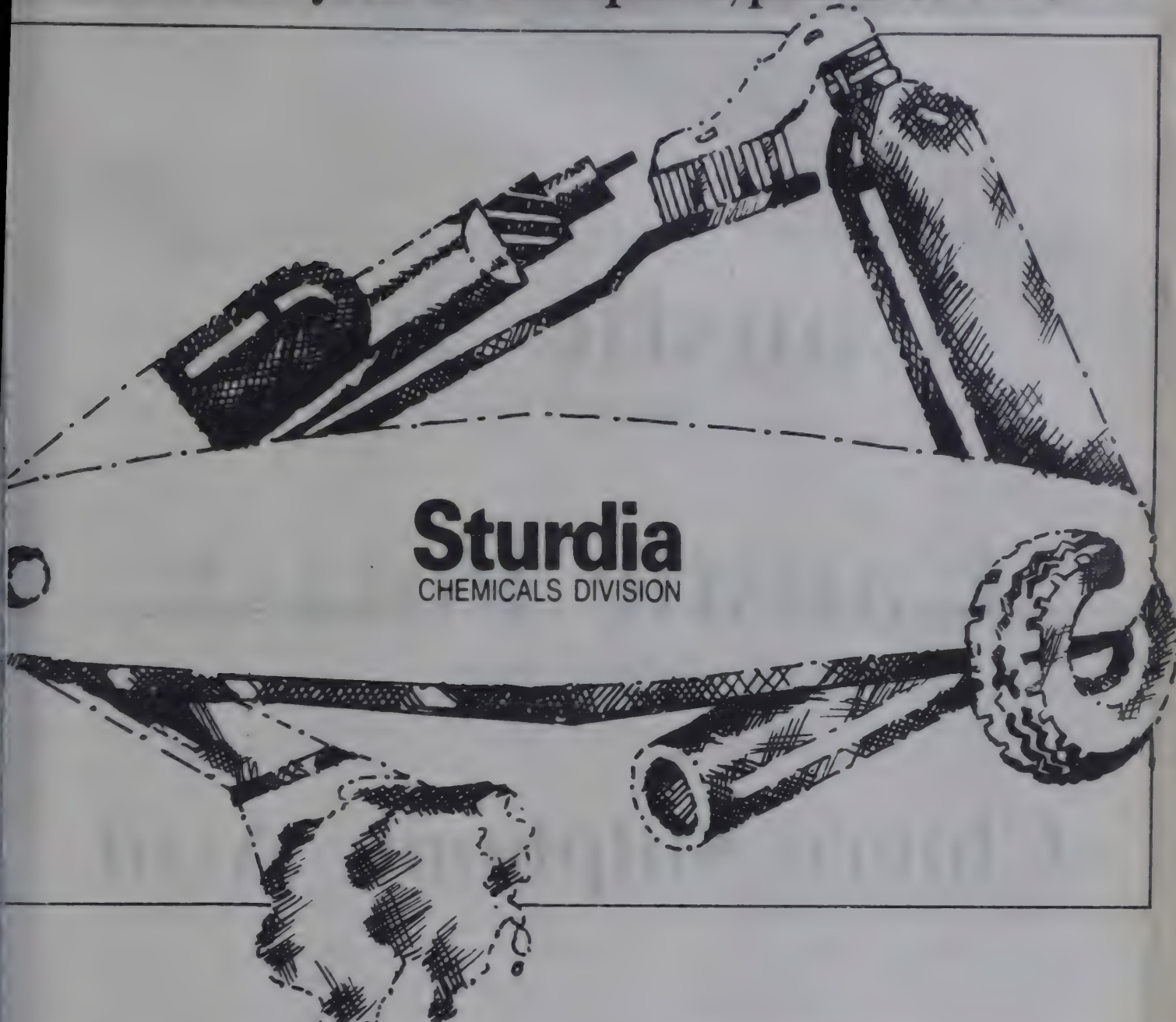
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CHEMICAL WEEKLY

VOL. XXXIII

JANUARY 12, 1988

NO. 18

Automation and Unemployment

introduction of technology into the workplace does not contribute significantly to higher employment and in fact should be encouraged only as a way of raising productivity and overall employment", a National Academy of Sciences report concludes. Technological change is an essential component of a growing, expanding economy. Rather than producing unemployment, technological change will make a maximum contribution to higher living standards, higher employment levels if appropriate public and private policies are adopted to support the adjustment to "new technologies". Policies should focus primarily on helping displaced workers "through job search assistance, basic skills training, training in new job-related skills, and advance notice of plant shut-downs and large permanent layoffs".

A report, *Technology and Employment*, prepared by a 10-member panel drawn from labour, industry and government was commissioned to resolve conflicting views about effects of technological changes on employment. Although technological change may lead to job losses at first, its larger effect is to lower prices of goods, thus spurring demand and creating jobs in new areas. The panel focussed on two groups adversely affected by technological changes; "experienced workers who may lose their jobs as a result of the adoption of new technology, and labour force entrants, whose employment prospects may be reduced by technological change".

Technology has traditionally heightened the political tension between the blue collar and white collar workers. Manual workers, the primary victims of automation, have for long advocated a more even distribution of the benefits of technology-derived gains in productivity and living standards. Generally speaking they have not achieved their desired objective. Rather than reduce everybody's work by a few hours, the tendency is to let the ranks of the unemployed grow. The Technology fall-out is still regarded as the property of the few and not the property of the community. Workers of an earlier age turned to unions in search of freedom from oppressive management, from

exploitation, from unsafe and unhealthy working conditions. Today's workers look upon unions as instruments to achieve the freedom to participate in the discussions that affect their jobs, their commitments, their society, to explore their minds, to grow and enrich their lives, to move forward to a better life. Technology promises this and workers want society to fulfill this promise.

As computers and robots take over more and more functions in the factory, a two-tier work force will develop. At the top will be a few executives, scientists, and engineers, professionals and managers performing high-level, creative, high paid, full time jobs in a good work environment. At the bottom will be low paid workers performing relatively simple, dull, routine, high turnover jobs in a poor work environment. Secretaries as well as filing clerks, book keepers, purchasing agents, pay-roll clerks, special librarians and the like are being replaced by microcomputers that can read printed and typewritten text and are beginning to be able to read freehand printing and recognise voice commands. CAD-CAM-Computer assisted architectural and engineering design is replacing draftsman.

The point to be appreciated is the fact that the coming two decades will witness an inexorable reduction in the number of simple dull routine jobs that have absorbed a large number of workers in the past. Precisely because many low level jobs are repetitive and require little creative intelligence, they are prime targets for automation. As soon as a large firm in a given industry replaces its clerical workers with machines all other firms in the industry will be forced to follow suit or become non-competitive. It is difficult to imagine how labour unions will be able to counter this trend, since then the only recourse will be protectionism; but; protectionism, in an interdependent world economy is an exercise in futility.

Two historical parallels are useful here. At the beginning of the twentieth century approximately half the USA's labour force was agricultural. Today about 5% of the labour force is in agriculture. Such a massive change in work pattern could have been violent and

bloody. But surprisingly, it was relatively peaceful, although it caused widespread suffering. More recently there has been an equally dramatic shift in the urban labour force from production to service. The Census Bureau of the United States now estimates that 25% of American jobs are in production and the rest in service occupation. Again the transition has not been without suffering but it has been remarkably peaceful.

In a survey conducted in 1972, among graduate class students, Thomas J. Moore found 43% of those who attended college are employed in jobs that do not require a college education. He added that the situation in 1983 is worse than 1979 and it will continue to get worse and not better. Expert Systems will reduce the demand for human experts in the developed countries. We are evidently approaching a period when wealth will increase while the number of jobs in traditional high employment areas will decline, no matter what government policy is followed. This will be a world-wide phenomenon. The most immediate needs of society will be met with a smaller number of workers supported by automation and information technology. This will be a permanent social feature. The AFL-CIO-Report on the Future of Work is not very different from Orwell's vision of a society divided between a party elite and a vast leaderless mass of people.

The first lesson to be drawn from historical shifts in work pattern is that the society can accommodate a remarkable amount of change without disintegrating. A second lesson is that with a little understanding a great deal of suffering can be avoided. A third lesson is that if labour is released from one area, it tends to be absorbed in another. The real objective is to educate the labour unions that progress and productivity will be better served not by sheltering the employees from the jobs threatened by automation and foreign competition, but to educate the workmen to shift from their historical function as production specific lobbies to a potential function as partners in an effort to plan the country's future.

Machines can work longer hours, in more arduous surroundings than people can. They are not distracted when performing repetitive exacting tasks. They can remember more information more accurately than human beings can. But people are superior to machines in relating to other people and perhaps the next great growth area in employment will be in the interpersonal sector of the economy in which people are paid to interact with other people. It consists of all jobs that require caring, instructing, adjusting, mediating, managing and creating. Such jobs are not classified as serious jobs. These are not routine, or mechanical.

A recent ILO study warns that microelectronics a major threat to employment. An ILO study, which shows dramatic shifts in the nature and number because of the micro-electronic boom says new technology holds both enormous threats and great trial. "Misused, it may well contribute to the destruction of life on the planet." The Study was conducted by Dr. Raphael Kaplinsky of the Institute of Developmental Studies at the University of Sussex in England. Examining the impact of this high technology on employment, the study reports that in the Japanese automobile industry each robot replaced 0.7 workers per shift while in the United Kingdom was 1.4 workers on average. In the United States robots replaced approximately one worker per shift while in West Germany each electronic machine tool displaced two to three workers.

If a more optimistic alternative is to be found, rely on market forces alone to reorient research and production will not be enough, Kaplinsky says. It will be the Governments "to ensure that suitable policies are proposed and implemented". Inter-governmental co-operation, International aid agencies and the United Nations also have a role to play in this effort.

Five main conclusions are reached in the study. (i) The diffusion of micro-electronics in advanced countries has been uneven but rapid and has involved a comprehensive range of products and processes. (ii) Although there is evidence to support diverse views on the new technology's impact on work, levels of employment are likely to decline in the long term, either through numbers fully employed or through part-time employment or shorter working hours; (iii) Craft skills are being displaced and only partially replaced by a demand for higher level human resources; (iv) There is a clear scope for social choice because alternative patterns of organisation co-exist with the diffusion of similar technologies; and (v) In the Third World use of new technology appears to be limited to a number of non-industrialising countries.

There are many today who feel that the consequences of technology will be to provide an airy blanket under which we can float through our lives in blissful ignorance. Others feel that high technology will set the stage for heralding the greatest tyranny the world has seen. The point to remember is that the microchip, laser, and fibre optics are part of the technological elaborations of technology but the raw input is still the human spirit, human spirit and perhaps human idiosyncrasies and unless they are appreciated and man learns to share the fruits of modern technology, equitably, it may as well spell the doom of mankind.

HEMARENA

VENKITESWARAN

Retrovir sets a Record

Retrovir or AZT the drug for AIDS has set a record time for securing approval as an IND from the Food and Drug Administration. This perhaps reflects the anxiety in Government and the public for findings to counter this new scourge. It is said that only two and half months were taken as against an usual 18 months for getting approval of the New Drug Application. A new regulatory classification 1-AA assures top priority for experimental drugs for diseases that are "immediately life-threatening" or for which "no alternate therapies exist" -- AIDS falls in this category.

Although Wellcome, the producers say that no criticism was discarded but the whole process was commended. A total of 21 months only were taken from the start of tests on humans before the commercial release. There were no short-cuts in the preclinical and development stages. FDA's procedures have been streamlined and could benefit other applications in the "march to market". A recent study estimates the expenses of developing a new drug at \$65 million and if the "opportunity cost" of research investment is taken into account the figure goes up to between \$103 million and \$150 million. The high cost of a new drug is obvious and the area of R & D is therefore restricted to the diseases for which such costs can be justified in terms of the probability of return -- namely for chronic and degenerative diseases. "New Chemical Entities" or "NCE" which come from the screening of 1 in over 5000 of those studied and 95% of drugs tested on humans fail to become commercial products.

Development by the pharmaceutical industry in USA is near saturation. It is said that at any given time only 1 to 2% of 2,000 drugs tested clinically have a chance to be marketed as a new drug. Computer modelling, new analytical methods, and improved concepts in molecular biology have helped to screen NCE's more quickly. Biotech firms have developed chemical probes to locate the gene controlling production of a key protein. Antiviral drugs are still an area of intense research effort but there is less of random screening. It is not only the activity but the side reactions, by-products, mechanisms, analytical procedures and con-

trols, the time element for activity -- all have to be spelt out. Then come the tests on animals for activity and toxicity and the product then moves up to gram quantities from milligrams before an IND application can be made. After IND status there are three stages of clinical testing -- (1) safe dose range and means by which it gets cleared from the body and toxicity levels on healthy volunteers; (2) tests on patients as compared to a control group on a "double blind" basis; (3) safety, effectiveness, preferred dosage for a specific ailment, adverse effects -- a way of fine tuning the drug by the doctors. There is also a phase 4 comprising post-market studies, long term effects etc. In the case of Retrovir even the phase II studies were cut short when the drug showed signs of effectiveness as evaluated by a Data Safety Monitoring Board. The conclusion by the DSMB was that it would be unethical to deny the drug from those who were getting only placebos. A total of 282 patients were tested on Azidothymidine or AZT at 12 US centres in 1986 -- of 145 who received AZT only one died while of 137 who did not, 16 died.

Very detailed studies have to continue on Retrovir even though approved, for the Phase III tests have to be completed. Over 3000 patients are now said to be under study. It is reported that the NDA for Retrovir is one of the best documented cases -- 20,000 pages in 55 volumes. The documents include the series of six reactions by which the precursor thymidine is converted into AZT. Thymidine is a side product from DNA in salmon and herring sperms and about 25lb/year was all that was produced. Pfizer developed a 10 step synthesis to produce it in tons. The precise steps of the process, particularly of purification, are important and flow sheets of materials including recycles have to be provided. The manufacturer has to keep all records relating to production batches. The treatment has to record allergic reactions -- should be less than 1 in 1000. Any alteration in the process or raw materials has to be got cleared by the FDA after providing all supporting data.

Last year (1986) 24 NDA's got approvals of the FDA in USA. There is said to be much more speedy assess-

ments, particularly in case of the drugs meant for the severely ill. The drug industry of USA is fully in conso-

nance with the methods and stipulations of authorities for they cannot afford to go wrong

Trace Elements in Foods

A coordinated Research Programme on Human Dietary Intakes of Biologically Important Trace Elements is being carried out with International Atomic Energy Agency -- IAEA -- as the coordinating agency. The study is on the diets of 12 sample countries -- Australia, Brazil, Canada, China, Iran, Italy, Spain, Sudan, Sweden, Thailand, Turkey and US -- over half of the world population. Each country is to supply between 30 to 60 total diet samples representing foods consumed in typical families in each of three specific income groups -- high, average and low. The procedures for obtaining samples are specified and are expected to cover variations but perhaps do not include the irregular intakes of snacks and drinks. The 24 biologically important trace elements include calcium, iron, zinc, chromium, selenium, aluminium, arsenic, cadmium, lead etc. -- include those that are toxic in larger doses. Food energy, fibre, phytate content are also to be studied. The findings are intended to help formulate recommendations on health policy of the participating countries and perhaps may extend the study to more countries.

The IAEA initiated the study in late 1984. National Bureau of Standards, Food and Drug Administration and US Department of Agriculture are pooling funds and skills for the work. Trace nutritional elements are very elusive in regard to their role and little reliable information on their nutritional status is available and much of it is by inference. USA has been very active and a pioneer in nutritional sciences and in evolving RDA -- Recommended Dietary Allowance -- concept which specifies minimum requirements. There have been significant success in 2 areas -- food fortification for iodine deficiency to combat thyroid enlargement and fluoridising water to reduce tooth decay. But apart from these much of the present practices and knowledge are empirical and commercial advantage is taken of such inadequate data through the marketing of all inclusive food supplements etc.

It is of interest to note that the US portion of this work is headed by an Indian, G. Venkatesh Iyengar who is a resident of West Germany and was associated into WHO's studies on mother's milk. The FDA collects food

samples and delivers them to NBS for analysis. NBS is fully equipped for such work and FDA has been periodically checking foodstuffs sold in the market, particularly in regard to pollutants and pesticides. Levels of all samples are being done by USDA. NBS has excellent analytical methods and facilities and is running an ongoing programme of selection, collection, analysis, storage of biological specimens in liquid nitrogen.

The collection of samples is a very difficult task -- blending of all the components that are daily consumed in a selected household, freeze dry the mix and send it to IAEA which then sends the powdered sample to reference laboratories around the world. The samples are bombarded with nuclear radiation for analysis. The 24 trace elements are analysed by the Neutron Activation Analysis (NAA) which exposes the sample to neutrons in a nuclear reactor producing radioactive isotopes that can reveal the identity and quantity of constituent trace elements through characteristic signals. The NAA technique measures at the nucleus and not the surrounding electrons. It measures as little as 10^{-14} gm. per gram of sample. Up to 30 elements at one time. The preparations for analysis of the food material into a form suitable for analysis is difficult. A wide variety of individual foodstuffs have been analysed for reference data.

This study is expected to take over a year. But preliminary information may come out earlier such as the salt content of the diet of different countries and the wide variations among the intake of the 24 elements in different countries and populations. There are also wide differences in the quantity of intakes. The new data may be useful in updating the current RDA levels and most importantly -- whether the processed foods industry needs to add in so many artificial nutrients in its products or are satisfying the gullible sector of the population for a short ride. There is said to be an uncertainty in the response to food inputs is not a constant factor among people and populations. Additional analysis of components like hair or nails may be useful. The dangers of high cadmium and mercury are already well authenticated and more such hazards could come to light as a result of this worldwide effort.

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LAB available in plenty

The new year has ushered in a buyer's market for linear alkyl benzene (LAB), the key raw material for detergent manufacture.

Till late last year, Indian Petrochemical Corporation Ltd. (IPCL) was the sole indigenous LAB manufacturer, producing around 30,000 tonnes per annum. Approximately 70,000 tonnes used to be imported by the State Trading Corporation (STC).

The new year-eve saw two more units — Reliance Industries Ltd. (RIL) and Tamilnadu Petroproducts Ltd. (TPL) — entering the fray, both launching commercial production almost simultaneously.

LAB consumers, from giants like Hindustan Lever and Nirma to medium and small-scale units, who till recently had to queue up for imported LAB and run after IPCL are now enjoying the marketing triangle, with each producer coming to their offices and requesting for orders.

"IPCL chaps, who used to dictate terms, are now offering one rupee rebate", an industry source said. An IPCL official admitted that 'we are no longer in the race.' Unable to compete with the new entrants who offer better products, IPCL whose LAB technology is 10 years old, is moving into the small but safe market for liquid detergents, leaving the vast cake and powder market to its rivals.

With three sources of supply, the market has become dynamic and the price has come down to around Rs. 25 a kg., compared to STC's Rs. 50 to 60 a kg. for imported LAB. Big names like Lever and Nirma are patronising all three suppliers. Nirma, incidentally, is the single largest consumer, gobbling up around 50,000 tonnes a year.

The stripling from the South and the old warhorse from Patnalganga are aggressively marketing their brands in western India, the country's biggest detergent market. The Government's steep reduction in import duty on N-paraffin from 158 per cent to 30 per cent, giving RIL a cost advantage of Rs. 3,000 per tonne over TPL, has not dampened the latter's sales efforts.

TPL also has a locational disadvantage compared to RIL in serving customers like Lever and Nirma, both located in western India. TPL takes four to five days for delivery as against three days for RIL.

What is boosted TPL's morale, despite all odds, is that its claim of offering a superior product is being endorsed by a number of consumers. TPL's 'Superlab' claims to have the lowest molecular weight which enables it to produce high quality slurry. RIL's LAB has a higher molecular weight.

This may be partly due to the fact that RIL imports N-paraffin from different sources, and the quality differs from one refinery to another. In this respect, TPL has a distinct advantage, because its process is based on kerosene (which it lifts from Madras Refineries Ltd., in its neighbourhood) and is assured of consistent quality paraffin.

Whatever be the problems of producers, the consumers never had it so good. And the trend is expected to continue for some years until demand exceeds production. Insiders expect the market to grow at 10 to 15 per cent a year.

At present, the demand for cakes and powder is somewhat depressed because of scarcity of water in drought-hit areas. Sources in the industry expect all three manufacturers to have increased inventories in the new year.

'FUNDAMENTAL RESEARCH ON SUPERCONDUCTOR NEEDED'

Scientists should familiarise themselves with the fundamental texture, microstructure and technology of the high temperature superconductor if the systems are to be applied on a major scale in the development of the country, according to Dr. R. K. Iyengar, director Bhabha Atomic Research Centre (BARC).

Speaking at the 30th symposium on 'Solid state physics' sponsored by the board of research on nuclear physics, department of atomic energy, which concluded in Bombay, he observed, in his capacity as the chairman of the apex body of high temperature

superconductors, that while India is still miles away from solving the problem of technology transfer, it is imperative that an empirical approach be adopted in the direction.

OLEUM GAS LEAK : DATE FOR RELIEF CLAIMS EXTENDED

The Supreme Court on January 14 extended till March 31, 1988, the time to file claim of compensation by victims of the oleum gas leak in Dehra Dun in December 1985 from the Shriram Fertiliser Industries.

The chief justice Mr. R. S. Bhanu Prasad, Mr. Justice S. Natarajan and Mr. Justice M. N. Venkatachaliah said that the Delhi aid and advice board will consider the applications for claims till March 31, 1988 and scrutinise them by May 5, 1988.

The court gave the direction that the DCM petition for review of the court's judgment came up for hearing.

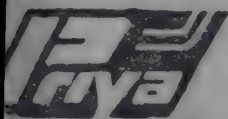
NO SHORTAGE OF VAM

Polychem Ltd., a manufacturer of vinyl acetate monomer, has clarified that there is no cause for resin units to be hit by shortage of raw materials as there is no shortage of VAM, an important raw material used by resin units.

Polychem itself is working its plant at full capacity. Further, it has no pending orders. The total installed capacity of VAM in the country is 20,000 tons per year and the current demand is hardly 10,000 tons per year.

Polychem has said that in view of the adequate installed domestic capacity and the landed cost of imported VAM at 1,100 per tonne (cif plus customs duty) being nearly the same as the domestic product, there is no need to allow the import of VAM under OGL as suggested by the users.

The price of VAM has been raised by Rs. 2 per kg. from November 1987 as it has been necessitated by the revision in the price of molasses alcohol by the government of India from October 1, 1987, resulting in price increases of alcohol and acetic acid, raw materials in the manufacture of VAM.



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Discrimination urged in technology import

Dr. Raja Ramanna, noted nuclear scientist, cautioned the government against the indiscriminate import of technology and scientific equipment.

Inaugurating an Indo-U.K. symposium on biomaterials in Trivandrum, Dr. Ramanna emphasised that import should be within the technological capability of a country.

"Self-sufficiency allows for confidence-building and for future development which no import can. Besides, self-sufficiency in one field makes a tremendous impact on the rest of the industrial infrastructure, and this is of special importance to a large developing country which has big internal markets.

Dr. Ramanna, who is now chairman of the Indian Institute of Science, Bangalore, referred in this context to Iran. "So many projects were started on the basis of imports during the days of the Shah without the necessary infrastructure that much of the equipment is now lying idle."

He said the approach of the planning commission to technological projects left room for improvement. "Sometimes, it happens that, after much discussion, a project is approved only to find that, as a result of ad hoc prorata cuts, only half the project is financially sanctioned. Technology in the public sector cannot sustain itself on such half-hearted measures."

He referred to the keen interest taken by Jawaharlal Nehru and Mrs. Indira Gandhi in the atomic programme and other scientific projects and said: "Political support is such a vital component of technical development, especially in its early stages, that it is interesting to examine how the political leadership of the times made it possible to make these strides."

Emphasising the need for keeping up the morale of scientists, Dr. Ramanna said both Mr. Nehru and Mrs. Indira Gandhi used to insist "on the consultative process when taking important decisions. Nothing was done in an arbitrary manner."

He recalled how all the persons concerned were called to a meeting when a decision on separating the space department from the atomic energy department was taken.

"When senior posts were being filled, we were all asked for our views

in Mrs. Gandhi's presence. This was the case when Dr. Bhabha died in an aircrash and his position had to be filled. In this way, she kept the morale of the scientists at a high level."

The symposium has been organised by the Sri Chitra Tirunal Institute for medical sciences and technology in collaboration with the British Council.

TAPS RADIATION STILL HIGH

The radiation to which plant personnel at the Tarapur atomic power station have been exposed is still significantly high even though it has decreased progressively since 1977.

The first-ever safety review of the TAPS by an independent body of experts, headed by Prof. K. Sri Ram of the Indian Institute of Technology, Madras, has brought to light some sensitive information which had remained confidential so far.

The number of persons occupationally exposed was the highest at 4,010 in 1980. It came down to 2,820 in 1985. The average annual exposure was in the range of 1,500 to 1,600 milliRem during the 1970s and it reduced progressively to 942 mRem and 985 mRem in 1984 and 1985.

The normalised collective dose during 1985 worked out at 118.5 man Sieverts per gigawatt of electricity produced. Noting that this figure is 'still significantly higher,' the committee quotes the comparative figure for the boiling water reactor in the U. S. and Japan. In 1975, the U.S. recorded a maximum of 22 man Sv, while Japan showed a maximum of 83 man Sv in 1977.

Conceding that scope existed for a further reduction in this collective dose level, the committee has pointed out that the units of TAPS are the only reactors of 1960 vintage in the world which are still 'operating at an acceptable commercial level.'

The committee has listed many aspects which require immediate and further improvement as well as those worthy of emulation by other units. Despite the shortcomings noticed in the plant operation, the committee concludes:

that the station management is responsible and technically alive, and alert to personnel, plant and public safety;

that the state of health of the staff is adequate to permit continued operation; and

that the recommendations be implemented on a priority basis to improve the safety status of the plant. It was recommended that a similar review be conducted sufficiently early to enable a decision on the continued operation of the plant beyond its design life.

The committee has noted that the radioactive discharge into the environment through air and water have significantly reduced. The liquid discharges which were as high as 10 per cent of the permissible level in 1975 have now come down to less than six per cent. Similarly, the gas release was reduced from 10 per cent in 1979 to four per cent in 1985. The Emission of radioactive Iodine-131 in the form of gaseous iodine is 1.35 per cent of the permissible level. The permissible levels themselves have been reduced in March, 1978, making the standards more stringent.

The services of specialist contractors are used for working in radiation areas. The committee recommended that "a fool proof system of monitoring the exposure of such personnel is necessary to ensure that the exposure limits of these personnel are not exceeded".

The committee during its field visit noticed that protective clothing has not been worn to the extent applicable for the location and the job. The health physics staff had prescribed correct protective clothing.

A number of recommendations made by a task force which examined TAPS in the light of the Three Mile Island accident in 1979 still remain to be implemented.

Setting up dedicated fire-fighting crew, testing communication channels with outside agencies during emergency drills, establishing a special radiation treatment centre, reducing radiation levels in sample stations and lining up the circulation pump, the safety of the fuel pool and radwaste building are among the other recommendations of the committee.

The Sri Ram committee made its report to the Atomic Energy Regulatory Board in August, 1986 but its contents were kept confidential. A few days ago, some of the recommendations of the committee were made public to answer the criticism that the AERB had not carried out any independent safety analysis.

Gupta Trading celebrates silver jubilee

Gupta Trading Company, Bombay, a leading trading organisation in chemicals & dye intermediates is celebrating silver jubilee this year. During a span of twenty-five years, the firm has carved a niche for itself in chemical importing and trading. Gupta Trading has earned a reputation of a dependable and a source of quality raw materials for Bombay's chemical trading community.

The spirit behind the firm is Shri Ramchandra C. Gupta, a soft spoken, mild mannered personality, who started a hard beginning. Shri Gupta came to Bombay at the fag end of the Second World War and established the firm in 1963 importing chemicals, dyes and intermediates. By sheer hard work and armed with acute business acumen, Gupta rose to become a top ranking marketing chemicals. So much "Gupta trading" today spells "quality and dependability".

Shri Ramchandra Gupta, born in a family in 1918, hails from a backward area of Haryana. After his education, Shri Gupta moved to Calcutta in 1947 and entered jute business. Over the years, Shri Gupta had built up a good reputation in jute exports. With the decline of jute exports in the 60's, Shri Gupta shifted his quartermaster activities to Bombay and began the import business. After twenty years of yeoman service, Shri Gupta today a well-known personality in the chemical field.

Being philanthropic in nature, Shri Ramchandra Gupta has established 'Gupta Charitable Trust' in his hometown in Haryana. The Trust runs a Girl's High School, at a backward area, and is imparting free education to about 400 girls every year. All the students not only get free education but also free boarding and lodging. Every year about 60 students from the school are brought to Bombay on study excursion, with their on-cost borne by Shri Gupta. He is seriously contemplating to establish a

small hospital for the backward community in Haryana.

Amongst other activities, Shri Ramchandra Gupta is a managing committee member of Chemical & Allied Merchants Assn., besides being a member of Haryana Nagarik Sangh, Bombay. He is also a member of All India Imports Assn.

Gupta Trading is celebrating its twenty five years at special function to be organised on 9th Jan. at Bombay. **Chemical Weekly** takes pleasure in congratulating Shri Ramchandra Gupta and his firm Gupta Trading Co.

INSA AWARDS FOR 11 SCIENTISTS

The Indian National Science Academy (INSA) will honour 11 scientists from the country for their distinguished research during its four-day 53rd

anniversary meet. The celebrations began recently at Poona University.

The INSA session will also include a series of lectures by the award winners during 1986-87 and the anniversary address by Dr. A. S. Paintal, its president and the director general of the Indian Council for Medical Research (ICMR).

The INSA medal winners are: The S.N. Bose medal for Physics to Prof A. N. Mitra of the University of Delhi, K. R. Ramanathan medal for Atmospheric Studies to Prof Miss Anna Mani, currently with the Raman Institute, Bangalore, K. S. Krishnan medal for Natural Sciences to Prof S. K. Joshi, director, National Physical Laboratory (NPL), New Delhi.

The INSA prize for Materials Science to Prof Ananthraman of the Benaras Hindu University, Varanasi, Chandrakala Hora memorial medal to Prof N.B.K. Nair, chairman, state committee on science and technology and environment, Kerala, Homi J. Bhabha medal to Prof S. Chandrasekhar of the Raman Institute, Bangalore.

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Science education needs toning up

"The state of our universities is becoming worse and worse with time" said Prof. C. N. R. Rao, president of the Indian Science Congress at Pune on January 7.

In this presidential address to the platinum jubilee session of the Congress he said unless something was done about higher science education in our universities, there was little hope of science prospering.

Dedicating his address to the memory of Srinivasa Ramanujan, C. V. Raman and Nehru who had ensured a place for the country in the world of science, he said higher science education in the country recently presented a rather dismal picture and academic activities were at a low ebb.

"It is at the undergraduate level that there is a sudden gap in the quality of education," Prof. Rao said. He called for specialised training opportunities for undergraduates to help them pursue a professional career instead of becoming scientists. But in the science specialisation stream only those who wanted to become scientists should be selected and they should be given the best institutional infrastructure.

Mismatch

Referring to the shortage of manpower in crucial advanced areas of science and technology and also to a large number of unemployed and under-employed graduates at the same time he said this mismatch in manpower training had to be tackled very soon. "The highly trained manpower required by the year 2000 AD has to be produced now" he said.

The reason for very few peaks of excellence, he said was not due to insufficient funds and facilities alone. "It is partly because of the rather depressing atmosphere that we (scientists) have created for ourselves. We easily compromised to mediocrity. We, senior scientists, have not done enough to see that the atmosphere is truly conducive for scientific work".

On the theme "frontiers of science and technology: the Indian context" he said since the country had decided to take the path of science and technology to ensure development of society, we had no choice other than to be abreast with the frontiers. Science

and technology was essential to ensure food and health for the poorest among us, to find alternative sources of energy and substitutes for the depleting natural resources and therefore "we cannot afford to depend on advances elsewhere and depend on other countries to provide the help we need".

Dedication necessary:

Prof. Rao said that despite oppressive bureaucratic practices, poor infrastructure, shortage of talented workers, inadequate information systems, pressures to buy foreign technology indiscriminately, etc., the country had a chance to compete meaningfully in the frontiers if scientists approached the problems with dedication. According to Prof. Rao, chemical syntheses, chemical dynamics, catalysis, computer simulation, chemistry of line processes and new materials are the most important frontiers in chemistry today. Prof. Rao said, investment of Government and industry in chemistry and chemistry-based R&D, particularly in composite materials, and ceramics, should be increased in line with their importance.

Among other frontier areas he singled out parallel computing where, he felt, we had a good chance of becoming world leaders in software with great export potential.

Referring to the role of Government in promoting the frontiers of science and technology, he said simple egalitarian principles were not enough. Funding, he said, should be based on a national policy. He felt that a national science and engineering foundation should be established to examine how best scientific research could be funded.

Meanwhile, the Prime Minister called upon scientists to focus on key issues and come up with solutions after laying down time-bound objectives.

"Genius does not occur in isolation", he said and he appealed to scientists to achieve excellence in science and technology with the frontiers he had set for them. In expressing this he echoed the views of the Indian Science Congress President, Prof. C. N. R. Rao who had referred to the falling standards of higher science education.

Study of suggestion

Mr. Gandhi said he agreed with Prof. Rao's view that things had to be made smoother for the young generation to take to science and the Government would give the matter full consideration to the suggestion made by Prof. Rao. He welcomed the establishment of an inter-university centre for astrophysics in the city of Pune by the UGC.

"Science has unfortunately remained the privilege of the urban elite and excellence is imparted largely in English", he said. Emphasising the need for changing the situation, he appealed to scientists to contribute in any way towards achieving this.

He commended the efforts of the Bharat Vigyan Jatha which toured the country couple of months ago bringing science to the rural areas.

The fourth frontier of challenge, the challenge of peace, he said. Coming the INF treaty, he said scientists should warn society of the dangers — improper use of biotechnology and genetic engineering.

Statue unveiled

Mr. Rajiv Gandhi unveiled a statue of Prof. C. V. Raman. The Minister of State for Science and Technology, Mr. K. R. Narayanan released a commemorative stamp and the Maharashtra Chief Minister Mr. S. B. Chavan released a souvenir to mark the jubilee.

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N-E India floating on oil

North-east India is floating on oil, Dr. R. C. Fuloria, an expert at the Oil India Limited, has said.

At least 10,000 million tonnes of undiscovered oil and gas is present in the region comprising the upper Assam valley, Naga hills, Tripura-Manipur area, Dr. Fuloria said in a paper to be presented at an oil conference organised by "Urja" beginning in New Delhi, on January 11.

Through proper planning the "north-east alone can remove the deficient indigenous petroleum production in the country before the end of the present century", according to the expert.

Only 20 per cent of the total hydrocarbons present in upper Assam valley have so far been discovered. "The remaining nearly 5,000 million tonnes of oil and oil equivalent gas in place is yet to be discovered".

In the Naga hills, not even 10 per cent of the commercial oil present has been discovered so far and "the remaining more than 1,000 million tonnes is yet to be discovered".

Dr. Fuloria said that the Tripura-Manipur region may ultimately turn out "the most prospective basin of India with giant and super giant oil and gas fields in it". So far not even one per cent of this has been discovered in this basin.

To realise these high petroleum prospects, "specialised geophysical surveys, deep exploratory drilling and detailed integrated geological studies will be necessary", he said.

The large amount of money being spent on crude import "can be utilised to improve the effectiveness of our exploratory, development and production efforts", Dr. Fuloria said.

According to him the optimism on the oil front in the north-east stems from regional and detailed geological studies and a thorough analysis of all aspects of petroleum geology.

"The eocene sediments represent the principal source of carbons in all the three regions in the north-east", he said.

Most of the oil discovered so far in upper Assam is in structural traps. "Our efforts should be directed toward locating and testing lithostratigraphic traps for hydrocarbons".

At present only about one-third of the area of the upper Assam valley has

been properly explored for oil and gas. The remaining area of the basin still remains either very poorly explored or not explored at all.

The geological conditions suggest that at least half of the remaining areas should be as rich in oil and gas as the area which has already been explored.

According to the expert, hydrocarbon prospects in the Naga hills should be better than in the upper Assam valley because the eocene source rocks are better developed there.

The conference will focus on oil potential in the north-east and will be opened by Mr. Brahm Dutt, the minister for chemical and petroleums.

OFFSHORE OIL HUNT : MORE CONTRACTS FOR ALIEN CO.S LIKELY

Some more offshore blocks are likely to be picked up by foreign firms for exploration and exploitation of oil by mid-February as the negotiations between them and the Union Government on the issue are expected to conclude by then.

According to official sources, the discussions between the Government and the representatives of the foreign firms, which have been discontinued on account of Christmas and New Year, are to be resumed by the middle of this month. The talks are expected to last for about a month's time.

In the last month, the Union Government had signed two contracts for four blocks. Canada's International Petroleum Corporation was contracted for the exploration and exploitation of Block-KC-OS-IV; and the US combine of Chevron-Texaco for three blocks in the Krishna-Godavari and Palar basins. The work on the contracted offshore blocks is expected to begin before the onset of monsoon this year.

Five blocks, out of the nine, for which 12 bids in all were received from seven global oil exploration companies, are still under discussions.

The Government had in March 1986 invited bids from experienced international oil companies. The blocks offered were in Saurashtra and Kerala-Konkan basins on the Western Coast and Cauvery, Palar, Krishna-Godavari and Mahanadi basins on the East Coast.

WORKSHOP ON TRANSFORMER OIL

The Association of Masters of Petroleum specialising in organising a one-day Quiz/Workshop on Transformer Oil, on January 1988 at New Central Juhu, Bombay.

Transformer Oil plays a role in power generation. It is now self-sufficient in this oil has consequently resulted in substantial amount of foreign exchange which was being expended on the import of this oil in the country. A time has now come when problems arising out of a change that has been adopted in the country, namely, the use of transformer oil as transformer oil, should be discussed in a common forum. The transformer manufacturers, the oil manufacturers are all clarify to the end users all from the original oil to its maintenance in the field, specially that has to be taken in hand throughout its expected tenure of operation (age or life). This QUIZ/Workshop — a question and answer meeting, the first of its kind in India, will be addressed by eminent experts from the leading manufacturers of transformer oil stock, transformer oil and transformers as also research institutes like CPRI & ERDA.

The following companies had submitted their bids before the last on December 1, 1986: Albion International Resources, the US, Chevron, Texaco, the US, Amoco, the US, Netherlands, Brit Oil, the UK and Ken Hill Proprietary Co., Australia.

Incidentally, this was the third time bids were invited from foreign companies for exploration of offshore blocks.

In the first round of bidding in 32 blocks — 15 onshore and 17 offshore, were offered for exploration to foreign oil companies. Bids were received from four companies for 10 blocks. The round resulted in a contract being signed for Saurashtra off-shore block with Chevron.

During the second round in 50 blocks were offered, eight onshore and 42 off-shore.

Alcohol export opposed

A recent government decision to export of 700 lakh litres of industrial alcohol from two surplus states—namely, Uttar Pradesh and Maharashtra, has upset the alcohol-based chemical industry.

Industry sources say that when the alcohol scarcity continues in most of other states in the country, the government decision to allow export is strange.

Alcohol-based chemical industry has been expecting a major change in availability of alcohol in the country with the new molasses policy announced by the government some weeks ago.

The continuing non-availability of alcohol in the deficit states like Andhra Pradesh, Karnataka, West Bengal, Kerala and Tamil Nadu has forced numerous chemical units to either close down or work below 50 per cent of their capacity.

The chemical units in these states cannot buy alcohol from the surplus states because of the multiplicity of levies and taxes, and increased rates of alcohol there. Both U.P. and Maharashtra have an export pass fee of Rs. 1.25 per litre of alcohol if sold to other states for chemical industry.

The sources said that the high rates of export pass fee and other levies make it virtually impossible for the chemical units in other states to buy alcohol from U.P. and Maharashtra.

It is also felt in the industry circles that there could be a shortfall in production of alcohol even in the surplus states in the current sugar season in view of the expected drop in sugarcane production, caused by drought.

The government should, therefore, reserve the surplus alcohol in the country itself, instead of allowing the distilleries to export it. The distilleries are stated to have enough capacity to store this vital raw material.

MODVAT NOT HELPFUL TO ALCOHOL-BASED CHEMICAL UNITS

A tricky twist in the excise notification granting MODVAT benefit to alcohol-based chemical units has ensured that except for a few, no manufacturer stands to gain.

The Central Excise notification No. 231/87 of October 1 granted MODVAT benefit to 26 chemicals produced from ethyl alcohol. These are acetaldehyde, acetic acid, acetic anhydride, acetone, butanol, LDPE, styrene, polystyrene, vinyl chloride, polyvinyl chloride, vinyl acetate, polyvinyl acetate, polyvinyl alcohol, MEG, diethylene glycol, triethylene glycol, butadiene, ethyl chloride, ethyl acetate, diethyl phthalate, diethyl oxalate, diethyl ether, trichloro acetaldehyde, ethylene oxide, chloro acetic acid and SBR.

However, the excise concession will be granted only if the above chemicals are produced in the same compound where ethyl alcohol is produced. The operative part of the notification (which makes the concession non-operational for the industrial units), reads as follows:

"Provided that the ethyl alcohol is produced from molasses inside the factory where the same final products are manufactured, the credit may be taken . . ."

According to one manufacturer, "the officials who framed the notification perhaps did not know that distilleries and chemical factories are not located within the same compound."

RANKA CHEMICAL UNIT LAUNCHED

The Bangalore-based Ranka group has launched Ranka Chemicals Marketing Private Limited, a company in the business of marketing the products of various foreign and Indian manufacturers.

The company will offer not only direct line marketing activities of identifying customers, soliciting enquiries, submitting tenders and finalising contracts but will also include service marketing functions such as marketing strategy and planning, market research and analysis etc. The company also proposes to start a service for the placement of marketing professionals.

DR. DRAVID

Dr. Arun N. Dravid has been elected president of the All-India Institute of Chemical Engineers for 1988.

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Plastics use limited in India

Consumption of plastics in the building and construction industry in India has been limited because of its high costs, lack of awareness among end users and the traditional approach of builders.

This was found in a survey carried out recently by the public sector Indian Petrochemicals Corporation Limited (IPCL), in Baroda, to identify present usages and future potential of plastics in the building sector.

Plastics today contribute more than two per cent by value of materials going into the building industry in many advanced countries.

However, in India the usage of plastics for building applications during 1983-84 was estimated around 76,000 tonnes compared to 32.2 lakh tonnes in the United States, 27.6 lakh tonnes in Western Europe and 9.1 lakh tonnes in Japan.

Window profiles, sidings, drain, waste and vent systems, interior panelings and electrical conduits were some of the major plastic products used by the industry, the report said. Various plumbing and toilet fixtures are also made from plastics.

In India, some applications were not to be accepted and a few, like sidings, were unlikely to become popular except in the hilly regions where the approach to construction was similar to that in Western countries, it said.

But good potential existed in India for plastic components like window profiles, interior panels, water pipes and plumbing fixtures. Uses like partitioning profiles, floor coverings, handrails, cable conduits, shutters and blinds and toilet seats were already being popular in the metropolitan areas.

The report estimated that by the end of this decade, the total consumption of plastics by this sector in India would reach two lakh tonnes.

According to the report, plastics proved to be more versatile than

many of the conventional materials and were preferred for their cost-effectiveness and functional superiority.

Besides, they had more aesthetic appeal, better insulation properties, high resistance to corrosion and easy processibility.

Polyvinyl chloride was today the major plastic material used by the industry because of its versatility, according to more than 89 per cent of all plastics used.

The other significant usages were of acrylics, acrylonitrile-butadiene-styrene (ABS), polystyrene, polypropylene and polyethylene, the report said.

The report said that the emergence and growth of the modern petrochemicals industry in general and the plastics industry in particular had been one of the most spectacular developments in the world.

During the last four decades, global production of various plastics had increased from 1.5 million tonnes to more than 60 million tonnes.

In India, the consumption of all major commodity thermoplastics increased from 34,300 tonnes in 1965-66 to nearly 3.6 lakh tonnes in 1983-84. Growing demand for housing the world over had forced people to think of ways of reducing construction time, possible through prefabrication in factories, with materials suitable for mass production. Plastics had been a success in this regard, the report added.

PLEA TO CANALISE HDPE IMPORT

The acute shortage of high density polyethylene (HDPE) is forcing hundreds of consuming units of this vital raw material to cut back their production to as high levels as 30 to 50 per cent, according to sources close to the industry.

To put right the situation and to ease the prevailing shortage, the sources have pleaded that HDPE imports should be canalised. Since bulk imports usually provide the benefit of price advantage in the international market, the sources feel, it is better if an organisation like State Trading Corporation (STC) enters the field of bulk importing of HDPE.

ding position is bound to enable secure the material at competitive prices, the sources added.

Besides, the canalising agency of the type of STC is having well organised country-wide distribution network, the benefit of which could be reaped by the consuming industry.

The sources say that the indigenous supply accounts for 30 per cent of the requirements. The balance per cent, had to be met by imports.

Although the Government had allowed HDPE imports under Open General Licence (OGL), the global shortage of the commodity, the weakening of the dollar, etc. had contributed to the prevailing shortage with the result actual users are finding it difficult to secure their genuine needs in time regularly.

The situation recently turned critical, when the only indigenous supplier had to shut down the plant reportedly for maintenance purpose. Although there is not much difference between indigenous price and import price of the material, it is the irregularity of supplies which is hurting actual users.

At present the landed price of high density polyethylene works out to Rs. 29,729.70 per tonne against the indigenous price of Rs. 26,300 per tonne. There is customs duty of 127.5 per cent.

If the Government at the present juncture is not in a position to reduce the duty, it can at least canalise the imports with a view to obtaining the raw material at competitive prices. A bulk importing agency will be in a better position to bargain the price, the sources add.

POLYCARBONATE FILM FOR NAMEPLATES

The nameplates and front panels of electrical appliances are becoming an increasingly important application for Makrofol, an extruded film made from Bayer's Makrolon polycarbonate. An example is the graphic plate on the remote control unit for Philips audio and video equipment, which the Austrian firm Piesslinger had been making of aluminium until recently. The advantage of Makrofol film are lower price, suitability for multiple printing and

all plastic units decry high prices of HDPE

small-scale plastic units are facing a severe problem of high prices of HDPE, their main raw material. There is an annual shortage of about 100 tonnes of HDPE in the country. The international price of HDPE is Rs. 600-800 per tonne, which taking into account 127.5 per cent import duty makes the material very costly.

Small plastic house-hold manufacturers urged the Union Government to ask the Petrochemicals Secretary, Mr. J. Khan, to bring down the import duty to 75 per cent in the case of HDPE and PVC. The duty on all other plastic materials also should be brought down to reasonable levels so that import cost works out at par to that of indigenous materials, according to the small-scale Plastic Manufacturers Association's press release in Bombay recently.

In the case of PVC resins, the authorities seem to have made some miscalculations in determining the last revised structure because the modification of September 15, 1987, resulted in higher escalation of import duty. Small manufacturers are of the opinion that if this step is not taken by the Government soon, the indigenous manufacturers of raw materials like IPCL, Hindustan Polymers would further raise prices. Recently Hindustan Polymers had hiked the price by Rs. 1.70 per kg. for polystyrene which is mostly used by small cottage type manufacturers.

Unless the supplies of essential raw materials were easily available to them at reasonable rates, the processing industry would not be able to survive 1987.

and earn a reasonable profit, the release added.

GOOD SHOW BY NAMRUP FERTILIZER COMPLEX

The Namrup complex of Hindustan Fertilizer Corporation has achieved all-round improvement in production during the past few months.

An official spokesman Jan. 5 said three plants of the complex produced 17613 tonnes of ammonia and 29020 tonnes of urea in December last thereby achieving 95 per cent and 80 per cent capacity utilisation respectively. The Namrup-III plants began commercial production from Oct. 1, 1987.

The "Namrup-II plant" was also doing well and in 1986-87 it made a record urea production surpassing its past best achievement. It has shown improved production during the first nine months of 1987-88 compared to the corresponding period last year.

Steady power supply from the captive power plant was an important factor for the improved production, he said. The performance would have been even better had there been no constraints on adequate availability of natural gas, the raw material for production of fertiliser, he added.

In the despatch front also, the achievement was encouraging, the spokesman said adding in December, 1987, 53132 tonnes of urea and 1085 tonnes of ammonium sulphate were despatched from the complex. Altogether 2284 wagons and 1485 trucks were utilised for despatch in December,

I.I.Ch.E. SHORT COURSE ON CHEMICAL ENGINEERING FOR PLANT PERSONNEL

The Indian Institute of Chemical Engineers had announced a short course on Chemical Engineering for Plant Personnel. This course is open to Science Graduates, Engineers from other disciplines and also for Chemical Engineers. It will be held from Wednesday, January 20th to Saturday, January 23rd 1988 (both days inclusive) at Welcomgroup Searock Hotel, Land's End, Bandstand, Bandra, Bombay-400 050.

Scope of the Course:

To explain the most important concepts of chemical engineering science and practice, in a way so that the participants can utilise these concepts. In order to ensure maximum absorption of these concepts, these will be taught through industrial examples. The participants will also be expected to give their experience. Amongst the topics are: Material and Energy Balance, Thermodynamics and Kinetics, Distillation, Fluid Flow, Heat Transfer, Absorption, Filtration and Drying, Mixing, Materials of Construction, Plant Utilities, Instrumentation, Economics, Project Engineering, etc.

Please send your registrations along with course fee of Rs. 900/- per delegate to Dr. K. K. Tiwari, Department of Chemical Technology, University of Bombay, Matunga, Bombay-400 019. Phones: 477391, 484637, 484306, 484556.

The North-East Frontier Railway extended full supply by supplying wagons for loading, despite many operating constraints prevailing in this region, he added.

BULK DRUG INTERMEDIATES

A Pharmaceutical Company at Andheri would like to get Bulk Drug Intermediates manufactured on job work basis. The equipments required are: 50-100 L GLASS FLASK and 250-500 L GLASS LINED VESSELS with stirrer, condensor and heating/cooling arrangement; Dryers. Centrifuge etc. Interested parties situated near Bombay (upto Thane Belapur Road/Tarapur) having FDA licences and spare capacity may please contact :

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Appointments

BRAHMAN'AN : HAMBER CHIEF

V. Subrahmanian, managing director, Colour-Chem Ltd., has been elected president of Bombay Chamber of Commerce and Industry.

Mr. L. Doshi, chairman and managing director, Premier Automobiles has been elected vice-president of the Chamber.

Mr. Subrahmanian and Mr. Doshi will meet after the Chamber's general meeting scheduled to be held in April 1988.

Mr. Subrahmanian joined Colour-Chem in 1969 after serving Voltas for 11 years. He is also a managing director of Haycolour Ltd., Sri Lanka, and Colour-Chemicals Ltd., Madras.

Mr. DSP Financial Consultants Ltd., Bombay and Bayer India Ltd., Bombay. He is the president of the Indian Chemical Manufacturers' Association for 1985-87.

Mr. Subrahmanian is a member of the National Development Council for Chemicals as well as the apex committee for formulating a perspective plan for the chemical industry and of the all India board of technical education for a three-year term effective January 5, 1987.

A. PODDAR

Shri Atma Ram Poddar has been unanimously elected as the Vice-President of the Indian Chemical Merchants Manufacturers Association.

A Graduate in paint technology Shri Poddar is a promising industrialist of

high caliber. He is the Managing Partner of M/s. Pyne Chemical Products and M/s. Paragon Paints, 25 Strand Road, Calcutta-700 001, which manufactures paints, varnishes, protective rubberised compound etc. Shri Poddar has a wide range of social activities. He has been the President of the Rotary Club of Cossipur for the year 1986-87, Executive Committee Member of Bharat Chamber of Commerce and Indian Paint Association and associates with a number of social and charitable organisations.

SASMIRA CHIEF

Mr. D. N. Shroff and Mr. B. N. Kothary have been re-elected president and vice-president respectively of the Silk and Art Silk Mills' Research Association (SASMIRA) for the year 1988.

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C/o. CHEMICAL WEEKLY

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New Products

ELECTRONIC GAS DETECTOR

Abhitron India has successfully developed and sold electronic gas detectors.

This instrument is so sensitive to number of combustible gases like hydrocarbons and their derivatives (methane, propane, butane, toluene), halogenised hydrocarbons (m. chloride), alcohols (ethanol), ethers, nitrogen compounds and inorganic gases (ammonia) that it will detect very early before its lower explosive limit (LEL).

Abhitron gas and smoke alarm is a solid combustible gas detector which has been designed to continuously monitor the presence of even a very small leakage of any poisonous gas which has a life of 12/15 years. Since it detects also, it becomes a reliable fire alarm. Abhitron India has recently developed

a fire alarm system with 100 to 200 branches.

This has got applications in industries like chemicals, mills, fertilisers, petrochemicals, pharmaceuticals, boilers, paints manufacturers, breweries, oil and soap industries, food products, alcohol plants, mines, defence, hotels, R & D labs., electricity boards, etc.

Further details can be had from Abhitron India, 386 F/39, Mandodari Building, New Badam Wadi, Lamington Road, Girgaum, Bombay-400 004.

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For further information write to trochem Equipment Company Building, Sir Phirozeshah Me, Bombay-400 001.

POLYMER FROM CASHEW

The knowhow of the manufacture of phosphorylated prepolymer on cashewnut shell liquid (450 kg per batch level) is available for commercial exploitation from Sarabhai Space Centre (VSSC) vandrum, as a joint technology Regional Research Laboratory vandrum.

The prepolymer finds application in polyurethane industries as a retardant additive for polyols, manufacture of brake liners, pigments, powders, paints and varnishes.

Interested parties who are in line of manufacture of speciality polymers and polymer products, may write with details of their capabilities, present activities, infrastructure, plant implementation, financial background and their assessment of market of this polymer to VSSC.

For further details write to Mr. Technology Transfer, Vikram Sarabhai Space Centre, Trivandrum 695 022, Kerala.

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Pollution growing crisis in East Europe

past two decades, polluted much of Eastern Europe into an ecological disaster zone. Forests, contaminated rivers, lands, and crumbling cities. In the East, Eastern European officials regard pollution as a product of Communism, they eliminated the profit motive, the cause behind industrial pollution. As the owner of all factories, communist governments could not form purity standards.

It turned out to be the exact opposite. High-sulphur brown coal, plentiful in the West, continues to be the primary energy source for Poland, East Germany, Poland, heavily polluted countries — Czechoslovakia. East-bloc cars based on Volkswagen models lack antipollutant devices. East-bloc agriculture relies heavily on phosphate fertilizers.

The rugged geography aggravates the problem. Unlike the huge land area of the United States or the

Soviet Union, which can absorb much pollution, Eastern European countries are squeezed into a narrow, heavily populated corridor. But the main culprit could be the system itself. A factory manager is judged on how much he increases production, not on how much he limits waste. Fines levied against polluters remain low, and, in any case, the government as the owner of all property ends up paying the penalties. For these reasons, it is in the manager's interest to dump anything and everything into the river and air in order to meet the plan.

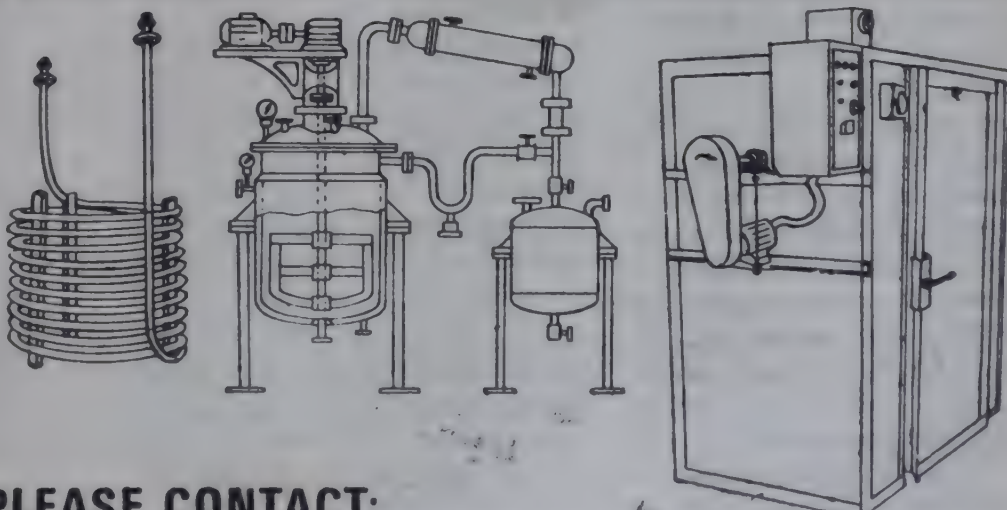
This emphasis on planning over people is illustrated in the northern Bohemian town of Most. In 1964, officials discovered that the town was sitting on a rich deposit of coal. To get at it, they made a logical, if extreme, decision. Not surprisingly, pollution problems mounted. Strip mining released clouds of sulphur water into the air and left a gaping kilometre-long hole next to the new apartments

built to house displaced residents. Town authorities have instituted wartime-like conditions. Residents are advised to go every weekend to the countryside. Children are taken away for weeks to cleaner south Bohemia, and at the worst pollution times, schools are ordered to keep children inside and limit their physical exercise.

Throughout the countries of the East bloc, long-term antipollution measures are finally being taken. Within the last decade, the East European countries have established environmental protection agencies, tightened up their environmental codes, and increased their spending on cleaning up the environment.

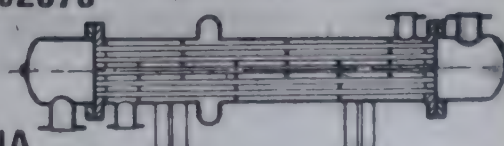
Modest successes are visible. A decade ago, swimming was banned in Hungary's Lake Balaton, because of dangerous chemical waste from nearby farms. Now the vacation spot's water is "first class". Even in Most, residents and officials report some improvement. Thanks to a vigorous tree-planting programme, the town's surrounding forests have stopped dying.

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Desulphurisation equipment and air filters have been brought for municipal heating plants, and a programme has been started to convert residential heating from coal to natural gas and to restore damaged buildings.

But ecological problems continue to mount. For every house restored in Most, many more deteriorate. Production remains the priority. Authorities are unwilling either to shut the coal mine or to promote energy savings by raising prices. Instead of moving fast on conservation, the East European countries are promoting nuclear power as the "clean" solution to their pollution woes. All are engaged in crash construction programmes based on Soviet technology. By the turn of the century, Czechoslovakia, East Germany, and Hungary hope nuclear fuel will satisfy about half of their energy needs. But as the nuclear accident at Chernobyl showed, Soviet-style reactors may themselves be environmental hazards.

Officials admit that additional safety measures taken since the nuclear accident have pushed up costs. Even so, many East Europeans continue to worry that their reactors lack necessary safety equipment. Environmental experts agree that Eastern Europe faces a stark choice. Either the region's communist regimes must change the way their economies are run and commit a larger share of their resources to environmental protection or those regimes will find their countries suffocated by pollution. The trade-off admittedly will be difficult to accept, either politically or economically. It means

nothing less than a decrease in productivity, price rises, even a perceptible decline in the material living standards of populations.

While East and West Europe talk a different, hostile language on most issues, they understand each other's concern about environment. Bilateral environmental pacts are becoming common. After signing its agreement with East Germany, Bonn initiated a pollution pact in October with Czechoslovakia, while under another treaty, Austria and Hungary share information on ecological problems.

— Christian Science Monitor

TOXIC DISCHARGE NEAR BOMBAY

A large number of industries on the banks of the Kulu river on the outskirts of Bombay, are creating a pollution disaster by discharging toxic effluents into the river, says a report.

High concentrations of mercury and other heavy metals in these toxic effluents, have adversely affected the flora and fauna and the problem of toxic chemicals might also spread to other aquatic environment in and around Bombay.

These revelations have been made by Dr. (Miss) Devika Nag, head of the Neurology department of the King George's Medical College (K GMC) in Lucknow in her report "neurotoxin in the environment" published by the department of environment of the Government of India recently.

Kulu is a small river which flows through the industrial suburbs of Ambarnath, Ulhasnagar and Kalyan in north-

east Bombay and finally into the Arabian Sea approximately 150 km. north of Bombay. The 150 industries on the bank ver.

The report said high nutrients have discoloured the water and made it acidic and saline.

Certain bacteria present in the water convert the insoluble into soluble forms which are absorbed by living organisms. Mercury enters the food chain and poisons fish and cattle which graze on crops in shallow water.

"Dead fish, dying plants, livestock, paralysed human infants and infirm children make up a grim picture in the village Ambavali.

FIBRE-CONCRETE COMPOUND

Austrian engineers have developed a fibre-concrete compound which can be used effectively to repair pipes damaged by corrosion in water.

Textile fibres are blended with concrete to form a compound which is then moulded into sheets. These sheets are inserted in place and bonded with a special adhesive. Preliminary tests have shown that the sheets are able to withstand chemical attack.

Mr. Roland Travnicek, head of the research team at the Concrete Technology Testing and Examination Society in Lower Austria, says "the use of these sheets will make that the repair of damaged pipes can be carried out at a considerably lower cost than has been possible hitherto.

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S. S. R. developing AIDS drug in space

Soviet Union is developing vac-space that could prove effective against immune system diseases, according to Mr. Nicholas Johnson a space-based analyst of the Soviet programme.

Johnson said in newspaper interview, "the vaccines have been under research in institutes throughout the Soviet Union to be used for research towards creating vaccines for various diseases, particularly those that affect the body's immune system."

A British publication, 'Jane's Spaceflight Directory' reported on December 8 that the Soviet Union is "almost certainly" experimenting to see if a drug against AIDS can be manufactured in space.

Johnson was quoted by the 'London Times' as saying: "the Soviet cosmonauts have been very productive in MIR (space station). They have done a tremendous amount of materials processing."

They have made great progress in growing crystals in a weightless environment and have carried out electro-phoresis experiments to produce a variety of pharmaceuticals. They have a new electrophoresis device on the Soviet space station (quantum) module attached to MIR."

Soviet scientists have reportedly stressed the importance of producing medicines in space free of the impurities that occur in even the most rigidly controlled environment on earth. For such preparation, thymosin, for example, could be produced on earth with impurities, according to the 'Spaceflight Directory' editor Mr. Reginald Turnhill.

Johnson said: "They have two different kinds of electric furnaces on MIR, which they use to see how materials behave in a liquid and gaseous state in a weightless environment."

One of these is a mirror beam furnace intended to study the crystallization of materials under weightless conditions.

Moscow Radio has said that the cosmonauts began work on December 10 to develop "the technology of obtaining high-impact alloys for building spacecraft."

Gallium Arsenide is also a much more efficient semiconductor than silicon for use in solar cells, he said. The MIR has already a Gallium Arsenide solar cell, which is much more efficient for producing electricity from sunlight, scientists say.

This new capacity to manufacture Gallium Arsenide for solar cells suggests that the Soviets will be able to extend greatly the operational life of their satellites without the weight and cost of nuclear power sources.

Gallium Arsenide is also important in infra-red sensors — a valuable tool for space reconnaissance and with far-reaching military applications, Mr. Johnson said.

IDMA URGES ABOLITION OF DPEA

Mr. Vinobhai U. Shah, the new President of the Indian Drug Manufacturers' Association (IDMA), has sought the abolition of the Drug Prices Equalisation Account (DPEA).

The Government in recent months had begun recovery of excess profits from drug manufacturers to be credited to this account, and some units had moved the court opposing the Government move.

Mr. Shah also a member of the National Development Council for Drugs and Pharmaceuticals (NDCDP), has also requested the Government to rationalise the duty structure on life-saving drug intermediates. It will contribute to the health of the industry and benefit the consumers too.

He also advocated the introduction of an escalation clause in the pricing mechanism so that manufacturers are not affected by interim changes in the prices of raw materials. Restoring the system of loan licensing in order to help small units was also necessary.

He has suggested that common testing laboratories (public as well as private) be established to facilitate adequate quality control on domestic drug production. Labs should be set up in important cities in order to avoid undue delay in getting consignments cleared and save importers from 'high demurrage charges, he has said.

IPCA FOR SINGLE DRUG AGENCY

The president of the Indian Pharmaceutical Congress Association (IPCA) Dr. B. D. Miglani, called for setting up an independent drug control administration at the national level to look after matters pertaining to drugs.

Delivering the presidential address on the opening day of the three-day 39th Indian Pharmaceutical Congress in Madras, he said the drug control administration in its purview should have the drug industrial development, drug control administration, certification of new drugs besides running of the appellate drug testing laboratories.

Independent drug control administration did not exist in 17 states and in most cases the directors of health services were asked to take care of the drug control administration, he said. Since drugs manufactured in one state could be distributed and sold in other states, the drug control administration should be strengthened by providing testing laboratories, he said.

HALDIA PROJECT COST MAY ESCALATE FURTHER

The Haldia petro-chemical project cost would further escalate considerably because of the Centre's non-clearance of it at an early date West Bengal Chief Minister, Mr. Jyoti Basu, said on 31st Dec.

Referring to certain New Delhi-based reports regarding the project, Mr. Basu said he could not understand why the Finance Ministry was delaying its clearance as the experts in the field had already certified that the project was viable. He said even its viability might be affected if the authorities continued to remain silent in the matter.

He said the project was changed according to the suggestion made by the Industrial Development Bank of India and other financial institutions. The foreign collaboration aspects was also causing anxiety as its term would expire soon. Earlier they had to renew the agreement several times in the absence of their real implementation as the original project was not cleared, he said.

Mr. Basu said the State Government had made an initial investment of about Rs. six crores and it was unable to make any further investment on the project unless the Centre cleared it.

Ozone depletion by man-made chemicals

The indiscriminate use of man-made chemicals called Chloro Fluro Carbons (CFC) is generating major concern among scientists over the future of the natural world.

It has been established that aerosol sprays containing CFC are creating a "hole in the sky" by destroying the ozone layer in the stratosphere, which is the earth's only protective shield against harmful ultraviolet (UV) radiation.

Ozone depletion is currently thought to be restricted over the Antarctica and covers an area bigger than the USA. If it spreads, however, to higher latitudes, the consequences of UV radiation could be catastrophic.

The grave effects of UV overdose would not be limited to any particular life-form, but will affect the whole earth.

Among humans, there would be a major increase in cancers and eye cataracts. UV can also suppress the immune system and parasitic skin diseases such as Leishmaniasis which is already causing problems in some parts of Africa.

As for plants and animals, they too would be seriously affected by the UV radiation. Agricultural productivity could drop drastically throughout the world.

At the same time living on the surface waters of the oceans would be affected and according to marine biologists many species would even become extinct.

The CFC chemicals are most widely used in north America and Europe as coolants in air-conditioning and refrigerating systems and as propellants in aerosol cans.

Being extremely stable, released, CFC can remain in the atmosphere for more than a century catalysing reactions, which lead to the destruction of ozone molecules and enable a deadly downpour of radiation.

Not until the beginning of the 1980s has there been concrete evidence of a case against the CFC. But recent research has dispersed all doubts.

As a consequence, representatives from 40 countries signed in 1985, recently, a binding protocol under the Vienna convention for the protection of the ozone layer.

The basic obligation of the countries is to cut their CFC production just over a third. Still, this is not enough, because a 35 per cent production cut will not prevent ozone depletion and the formation of new sky holes, but merely slow the process.

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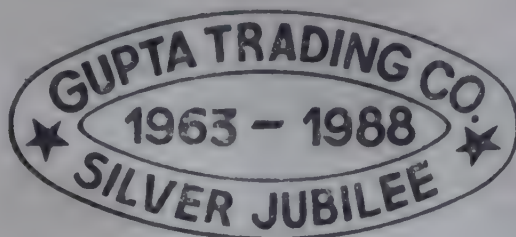
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Energy outlook dim

The energy scenario at the end of the Seventh Plan (1985-90) will worsen, judging from the pace of implementation of projects, especially in the power and coal sectors, and the growth in demand rising faster than increases in output.

An official review on Plan implementation shows that at the end of June 1987, 127 projects estimated to cost Rs. 34,210 crores in the power, petroleum and coal sectors were under implementation, many of them trailing behind the schedule.

The Seventh Plan provided an outlay of Rs. 54,300 crores (at 1984-85 price) in these three sectors. Cost overruns by the end of June 1987, were 50 per cent in coal and 45 per cent in the power sectors. The completion of the projects is expected to be considerably delayed in the case of both coal and power sectors.

The energy projects, inclusive of atomic energy for which also the cost overrun is 63 per cent, account for over 50 per cent of the major Plan projects whose total cost has now been revised to Rs. 68,704 crores.

The Ministry of Programme Implementation, which is monitoring projects costing more than Rs. 20 crores each, is hopeful that the target of capacity addition in the Central power sector (other than nuclear) will more or less be achieved, even though 28 out of 36 projects (including transmission lines) are running behind schedule. The latest position in regard to additions to generation capacity in the States where the bulk of investment in power is provided for is not available.

The total capacity addition envisaged in the Seventh Plan is 9,320 mw in the Central sector, including 705 mw nuclear power, and 12,925 mw in

States and Union Territories an overall total of 22,245 mw. There is confidence about adding the Central power sector including clear power, in line with the target, but there is uncertainty about the pace of achievement in the States.

The revised outlay for 32 projects under implementation in the Central sector is Rs. 15,651 crores against the original Seventh Plan outlay of Rs. 11,051 crores.

Despite additions to the capital outlay, power shortage in varying degrees continues all over the country.

The plant load factor of power stations is reported to have fallen to 50.8 per cent in April 1987, as compared with 47.6 per cent in April 1986, but there has been no reduction in high transmission and distribution losses which averaged around 22 per cent for the last three years. A one per cent reduction in T and D losses is stated to be equivalent to an increase in capacity of about 450 mw.

Substantial time and cost overruns have been reported also in the implementation of atomic power projects where a major problem is assimilation of technology by the equipment suppliers, as well as in coal sector.

The coal target of 226 million tonnes by 1989-90 is officially expected to be achieved to the extent of 220 million tonnes, which may mean that the gap would be filled from pithead stocks and higher quality of coking coal.

There have been delays in the execution of projects arising out of unavailability of land and equipment. Time and delay in getting various clearances. Coal output in the first five years of the Seventh Plan registered a growth rate of seven per cent and the increased offtake from the pithead stocks of coal which stood at over 22 million tonnes, came down to 22 million tonnes at the end of October 1987.

The capital output ratio in coal sector is showing a rising trend which is reflected in the losses being made by Coal India Ltd. The coal projects now under implementation are expected to cost Rs. 8,338 crores.

Crude oil production in the Seventh Plan so far is close to the annual target of 30-31 million tonnes. The Seventh Plan target of 34.53 million tonnes is likely to be achieved through

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(Contd. on p. 59, co

Berger Paints out of MRTP act

The recent acquisition of the Indian Berger group by Williams, the industrial conglomerate, worth \$133 million, the Indian Berger Paints India has come under the clutches of the MRTP Act. A report appearing in the *Economist*. This is the most significant effect of the take-over as far as an company is concerned and the advantage for Berger India, which is currently rated the third largest company in the country.

When the Berger group was acquired by Hoechst, the West German chemical group, which acquired it in 1974, the inter-connection with other companies in India, through the parent company rendered it an integrated company, as total assets of all companies stood at over Rs. 100 crores. The inter-connection with other companies is now broken and Berger India has no inter-connection with any other company in India. Williams Holdings is no longer in the fold of MRTP.

Williams Holdings, with an annual turnover of £700 million and 23,000 employees, now controls 23 per cent of Britain's decorative paints compared with 29 per cent of ICI Chemical Industries and 40 per cent of Own-Labour. This is actually Williams' second foray into the paint industry. It had previously bought Crown Paints, the second largest paint company in the UK. Nigel Rudd, chairman of Williams Holdings, who has been described by the *Sunday Times* as being one of the reasons for the British economy going back, said after the deal that the length of Berger's subsidiaries and associates around the world would mean that Williams Holdings would be the leading paint supplier in many countries.

The change in parentage is unlikely to harm Berger Paints (India) in any way. As the managing director Mr. Subberwal says, the agreement provides for continued technological assistance from Williams. Thus Berger India would be helped by getting state-of-the-art technology.

Kurien adds that the advantage of getting out of the purview of MRTP is tremendous. There would be fewer

restrictions on expansion of capacity. For the present, however, Berger has no plans to expand its production facilities, he said.

OUTLOOK FOR PAINTS

Even as the paint industry is bedevilled by idle capacity it has not paid serious attention to tapping the vast rural market. Addressing the annual meeting of the Indian Paint Association, its President, Mr. S. Subberwal, conceded that "at present the industry's emphasis is mainly on metropolitan markets and on the decorative aspect of paints, but in the coming years the industry would have to highlight the protective aspect and reach the masses with affordable paints for each segment". This brooks no delay as loss caused by corrosion is estimated at Rs. 2,000 crores a year, which is double the level of the industry's turnover. As this loss is expected to rise to Rs. 5,000 crores a year by the turn of this century, the industry must not only intensify its marketing efforts but also change the product mix to fully reflect the pattern of demand in the rural market, which has remained mostly untapped. While the industry must launch a campaign to make the public aware of the need to use paints for protecting national assets by controlling corrosion, the Government ought to play its part in encouraging the industry to meet this challenge. Even if the industry puts its best foot forward to raise the per capita consumption, which is only about 300 grammes against 25-30 kg in developed countries, there is no guarantee that demand for paints would appreciably broaden. Pessimism stems from the fact that it is not easy for the industry to bring its products within the reach of potential buyers in rural areas. Mr. Subberwal bemoaned that "it is, indeed, unfortunate that the industry has not been very successful in convincing the Government of its role since even now it is heavily burdened with both direct and indirect taxes". As the Government itself is the "largest buyer" of paints, the industry's demand for suitable tax reliefs merits consideration.

No less urgent is the need to augment the supply of basic raw materials. Titanium dioxide, a basic pigment, is invariably in short supply.

This is despite the fact that the country is endowed with vast reserves of ilmenite ore, which is the basic raw material for titanium dioxide. The root cause of the trouble is that Kerala Government's two undertakings, namely, Kerala Minerals and Metals Limited (KMML) and Travancore Titanium Products Limited (TTPL), which are the only producers of titanium dioxide, have failed to improve their capacity utilisation. Mr. Subberwal stated that "KMML, which has an installed capacity of 24,000 tonnes, has failed to produce more than 8,000 tonnes. Similarly, TTPL's production has been hovering around 8,000 tonnes, even though its installed capacity is about 18,000 tonnes". As these undertakings have repeatedly failed to fulfil their promise to improve their performance, it is good that the Union Minister of State for Commerce, Mr. P. R. Das Munshi, agreed to look into the matter. Mr. Das Munshi should help the industry to import linseed oil as "due to its non-availability the industry has to use many vegetable oils, which are far more expensive and are not necessarily required", as pointed out by Mr. Subberwal.

— Financial Express

ASIAN PAINTS RANKS AMONG 30 TOP CO.S

Asian Paints (India) Limited is the only Indian company to figure among the top 30 paint companies in the world.

The companies have been listed in the latest issue of the authoritative annual, "Facts and figures about the world's biggest paint manufacturers", by K. C. Luyben.

Asian Paints ranked first among these companies in respect of net profit as per cent of net sales and return (per cent) on shareholders' funds.

NAVDEEP POLYMER ON STREAM

The multi-layer polymer extrusion plant of Navdeep Polymer's Limited was inaugurated by the Union minister of state for finance, Mr. B. K. Ghosh at Kadi, Mehsana, a notified backward area in the state of Gujarat.

According to Mr. Chintan Parikh, director of the company, this project the first of its kind in India shall manufacture 100 per cent import substitution products like multi-layer cellulose acetate sheets and polycarbonate sheets.

Alum import from hard currency areas ruled out

The Government has decided not to import any aluminium from hard currency areas in the next financial year. In fact, the expectation in official circles is that aluminium imports would not be necessary at all next year.

Still, in view of the repeated failure of the domestic producers to fulfil their annual targets, the Government has decided that if any marginal imports are necessary, they would be done from the countries with which the Government has rupee payment arrangements.

The optimism in official circles on the aluminium front is based on the fact that the Orissa-based National Aluminium Company (NALCO) has already gone on stream this year and is expected to contribute around 40,000 to 50,000 tonnes by March next. The NALCO plant after completion of its second phase in 1988-89, is expected to contribute a substantial 2,18,000 tonnes in a full year and if this production materialises, the country is expected to turn into an exporter of alumi-

nium from its current status of an importer.

In the current year, however, the Government's projections of imports have already gone haywire and it is expected to import substantially higher quantities than was anticipated in the earlier months. While the domestic suppliers were expected to produce around 2,95,000 tonnes during 1987-88, imports were pegged at 45,000 tonnes during 1987-88. Imports were pegged at 45,000 tonnes only to make up the shortfall in domestic demand.

Production trends, however, reveal that imports this year would have to be at least 70,000 tonnes and consequently, the canalising agency for imports, the Minerals and Metals Trading Corporation (MMTC), has been told to go ahead with the contracting.

Official sources indicate that the shortfall in domestic production has been due to the usual problem of shortage of power. According to these sources, the situation at one time was

so critical that emergency imports of 15,000 tonnes were ordered for domestic industries.

The import of aluminium, while, has become a thorny issue, the international price of the metal is going up significantly. In fact, the London Metal Exchange (LME) registered such increases in aluminium prices that the imports of this metal at the actual sale at the pool price in the country has turned from a profitable proposition to a loss-making proposition.

The extent of the spurt in international prices has been so much that MMTC reported to the Government that the Corporation was losing heavily on aluminium imports and suggested that a figure of Rs. 13 was mentioned as the loss incurred on the imports of 45,000 tonnes.

Based on MMTC's plea, the Government lowered the import duty on aluminium from Rs. 3,700 per tonne to Rs. 2,000 per tonne towards the end of October this year. Still, at the current duty level, imports are a losing proposition, according to official sources.

The Government, it is understood, is reluctant to increase the pool price of aluminium from the current level of around Rs. 27,000 per tonne (inclusive) since it would mean reduced profits for the domestic producers and also adversely affect the casting industry.

On the other hand, a further reduction in import duty would have serious implications at a time when the Government was hard pressed to get for as much revenue collection as possible. Consequently, the matter is still pending at this point.

Imports of aluminium have been going up over the last few years, the quantum going up from 31,000 tonnes in 1985-86 to 55,000 tonnes in 1987. In the current year, imports are expected to be around 70,000 tonnes.

Domestic production, on the other hand, has been slipping from 2,64,000 tonnes in 1985-86 to 2,57,000 tonnes in 1986-87. In the current year, the target has been set at 2,95,000 tonnes which seems unattainable at present. Official circles, however, expect NALCO to make a significant contribution next year.

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Overall improvement in Balco output

duction of saleable aluminium products of Bharat Aluminium (BALCO) for the calendar stood at 92,000 tonnes, representing 95 per cent fulfilment of . The output of value-added extrusions, rolled products, showed an uptrend, compared to

is considered significant despite a major breakdown of a transformer in one of the rectifier-frequent power restrictions in the Madhya Pradesh Electricity Board (MPEB).

financial side, the Korba Aluminium complex reversed the cash deficit of Rs. 16.3 crores in 1986 into a surplus of Rs. 19.89 crores in the calendar year 1987, thus showing a favourable variance of Rs. 36.19 crores over the previous year's performance.

BALCO has agreed to assist BALCO in studying the feasibility of technological upgradation of its alumina plant at Korba. BALCO is seeking the know-how to modernise its plant and the programme is in the finalisation stage. Efforts are also on to help/modernising the Bidhanagar plant. The aim is to make it a unit for the production of aluminium semi-fabricated products.

Computerisation received a considerable impetus from commercialisation of production planning including preventive maintenance management of inputs and control. A comprehensive programme has been formulated to computerise

all marketing activities. Control of payments and pay-bill accounting have been computerised. The head office computer centre has all the computing facilities including full range graphics.

In the area of product development, items like mat ground surface and sophisticated high strength alloy billets required by the defence forces have been developed. To ensure speedy communication among the plants, head office and marketing zones, a radio-telephone system will be installed soon.

A major achievement during the year was the commissioning of the first unit of 270mw captive power plant at Korba in 33 months, which is a record in power project management. The coming up of the two subsequent units at an interval of two months each is also a record. The captive plant has commenced feeding power to the smelter and has generated 218 million units during the last four months of 1987, thus reducing the drawal of power from the MP grid.

Aluminium smelting process is highly energy consuming with power cost accounting for almost 50 per cent of the total cost. Even a marginal saving in electrical energy will result in a substantial cut in production costs. Following an energy audit of the Korba plant, trials for reduction in energy consumption by addition of lithium carbonate have been carried out successfully.

On this basis, operation on a commercial scale to reduce energy con-

sumption and pollution will be undertaken shortly. Oil consumption in the foundry furnaces has been brought down considerably.

(Contd. from p. 56)

the accelerated production programme of Bombay High and development of Cambay Basin and other projects.

The substantial investment of well over Rs. 3,000 crores already made in extraction, processing and transportation of gas may remain substantially underutilised till the end-users for the available gas are firmed up, it is officially stated.

All the gas-based fertiliser plants in the private sector and the three thermal power plants in the public sector are also behind schedule.

The current level of commercial energy consumption will pose tough choices for the planners, considering the magnitude of investment required over the next decade and the problem of meeting the minimum energy demands of the vast rural population.

While energy sector's outlay of Rs. 54,800 crores accounted for 30 per cent of the total Seventh Plan outlay, the energy investment projections for the Seventh and Eighth Plans are of the order of Rs. 125,000 crores and Rs. 175,000 crores respectively.

The Planning Commission is developing an energy product mix for the Indian economy for 2000 in order to ensure that energy requirements are met for the targeted growth rates of GDP and its sectoral components. In this context, the rationalisation of energy prices and adoption of energy-efficient technologies and conservation assumes great importance.

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Copper price cut

Government's pricing committee has reduced the MMTC's selling price of copper by Rs. 5,000 a tonne following reduction in its import duty.

According to a press note issued by MMTC on Jan. 1, the new price of electrolytic copper wire bars and copper cathodes is Rs. 75,000 a tonne against Rs. 80,000 a tonne.

The price of continuous cast copper has been reduced from Rs. 80,000 a tonne to Rs. 83,500 a tonne.

Prices of lead and nickel have increased because of rise in international prices and appreciation of sterling vis-a-vis Indian rupee.

The price of pig lead 99.97 per cent has been increased from Rs. 22,500 a tonne to Rs. 22,200 a tonne and the price of pig lead 99.99 per cent has increased from Rs. 22,200 a tonne to Rs. 22,000 a tonne.

The price of nickel briquettes has been raised from Rs. 1,75,000 a tonne to Rs. 1,85,000 a tonne, nickel pellets from Rs. 1,75,000 a tonne to Rs. 1,85,000 a tonne, and nickel plated strips from Rs. 1,77,000 a tonne to Rs. 1,87,000 a tonne.

The price of electrolytic high grade zinc is Rs. 31,500 and the price of special high grade zinc is Rs. 32,000. The price of tin is Rs. 1,20,000.

The price of other non-ferrous metals remain unchanged at their current levels. The new selling prices are for the period commencing from January 1, 1988, until further notice.

Copper comes down

The price of copper wire bars has been reduced further by Rs. 2,000 per tonne at Rs. 76,000, bringing the total fall in its price by Rs. 7,000 during the last three days.

The fall in price was attributed to the much awaited reduction in import duty on copper. This according to informed sources at N. Delhi enabled the MMTC to bring down its copper release price.

The price of copper wire bar in the local market was ruling at Rs. 75,000 a tonne in mid-December and gradually rose up to Rs. 83,000 on December 29 in anticipation of further price hike in MMTC price as a result of higher LME prices.

However, following the reduction in duty the rate dropped to Rs. 78,000 on Dec. 31 and further to Rs. 76,000 on Jan. 1. Similarly, copper heavy has come down from Rs. 74,750 to Rs. 70,000 and copper utensils from Rs. 60,100 to Rs. 57,000.

'IMPORT DUTY CUT ON COPPER INADEQUATE'

The reduction in copper import duty has been termed as absolutely inadequate in the prevailing circumstances by the consuming industry and trade.

"We are happy that the government has appreciated our difficulties and announced a cut in import duty on copper. It is a good step in the sense that it will halt a further hike in price at least for the next month", said Mr. K.D. Agarwal, senior vice-president of the Bombay Metal Exchange.

If the duty was not reduced at this juncture the release price for copper could have gone up to Rs. 90,000-95,000 per tonne for January 1988, from the prevailing Rs. 80,000. Now the price may hover around Rs. 75,000 to Rs. 80,000 depending upon the LME quotations, he said.

The ministry's decision to reduce import duty on copper from 140 per cent advalorem to 95 per cent can be categorised as "too little, too late", said Mr. Darshak Mehta, immediate past president of the Bombay Industries Association.

Even after duty reduction, the government will be realising 37 per cent more revenue than its budgeted estimations. The budgeted revenue was worked out on a lower LME base price and amounted to Rs. 24,000 per tonne as against which it will still be netting over Rs. 35,000 per tonne base on current LME prices and the pound parity of the rupee, he said.

Indications are that users will still have to pay around Rs. 75,000 per tonne for copper in January 1988, which is still double the international price on the London Metal Exchange. "The government's half hearted measure, thus, falls far short of industry's expectations and

demand that copper be made available at Rs. 55,000 per tonne," he said.

TRADE WANTS FURTHER CUT IN COPPER DUTY

Though the trade and industry had welcomed the duty reduction on copper items, it is not totally happy with the quantum of reduction offered.

An indication to this effect was obvious when Mr. K. L. Agarwal, Senior Vice-President, Bombay Metal Exchange (BME), said the slash in duty has no doubt checked the price of copper from any further rise.

The market position, according to him, will not improve with the recent duty cut. To achieve that a further reduction in the duty was a must, he felt.

In a telegram to the finance minister, the exchange while welcoming the measured relief in reduction of duty on several copper items after repeated pleas of the copper using industries said the import duty on copper prices should be further reduced to a reasonable level of Rs. 55,000 per tonne.

The exchange has also pleaded to include other non-ferrous metals like zinc, nickel, lead, tin in the basket of items earmarked for duty reduction.

The National Alliance of Young Entrepreneurs (NAYE) Vice-President, Mr. Vinod Saraf, has opined that the duty reduction was a great relief to user industry, particularly the small-scale units. The Government should have taken a more lenient attitude towards the plight of copper based industry.

FIRE IN BOMBAY FACTORY

Five workers were injured, one of them seriously, when fire broke out in a chemical factory at Dombivli on New Year's day.

Police said, the four injured were admitted to a local hospital while the serious one has been admitted to the ESIS hospital at Thane.

They were handling a container, which fell down and spilt the chemical contents. The fire erupted due to chemical reaction, the police said.

Package to boost project exports

The Government has decided on a package of measures including market development assistance (MDA) to give a boost to the exports of projects, particularly consultancy services.

Market development assistance will be provided for reimbursement of 50 per cent of cost of preparation and submission of bids for turnkey/construction project, and operation and maintenance service contracts, consultancy services.

MDA will also be given for opening and operating overseas offices by consultancy firms at the rate of 60 per cent of the approved expenditure for the first two years, 40 per cent of the expenditure for the next two years and 25 per cent for the fifth year.

Further, it has been decided to grant project assistance to the tune of 10 per cent net foreign exchange earnings from the services portion of the contracts in respect of industrial turnkey, civil construction and export of consultancy services.

For information support, Indian missions have been asked to furnish periodical reports on advance information on projects and services to Exim Bank who will computerise the information for suitable dissemination.

These measures have been taken to meet the stiff competition from developed countries and hostile environment for export in overseas markets, weak financial bases of Indian consultancy organisations and high cost of submission of bids.

Indian consultancy services exports though not very spectacular, have shown significant growth since 1982-83 and were valued at Rs. 80 crores in 1986-87. But there is tremendous potential for growth in the area of energy, oil and gas including power generation, offshore engineering, oil and gas installations. There is also scope for its growth in industries like cement, chemical, fertiliser, sugar, paper and pulp, drugs and pharmaceuticals, textiles, electronics and light engineering.

But the great deterrent for new entrants like India is the system of 'double envelop bidding' being followed by the multilateral funding agencies like World Bank for the projects financed by them.

Under this system, actual participation in project bids is dependent on successful pre-qualification and registration with the funding agencies. And for pre-qualification and registration, prior international experience of consultancy is generally mandatory and is rigidly followed.

FASII HAILS DUTY CUT ON COPPER

The Federation of Associations of Small Industries of India (Fasii), has welcomed the reduction in customs duty on copper from 140 per cent to 95 per cent with effect from December 30.

The Fasii president, Mr. P.D. Duggal, described the decision to cut customs duty "as a step in the right direction" to curb the runaway price rise in this essential raw material.

Mr. Duggal has expressed the hope that the copper price which was 80 a kg would come down to Rs. 66 from December 30, 1987 following the duty cut.

CUT HALF-HEARTED: BIA

The Bombay Industries Association (BIA) has termed the finance ministry's decision to reduce the import duty on copper from 140 per cent ad. val. to 95 per cent ad. val. 'too little, too late'.

In a statement recently, the BIA president, Mr. Darshak Mehta, said even after the duty reduction, the government will be realising 37 per cent more revenue than its own budgeted estimations. The budgeted revenue was worked out on a lower LME base price and amounted to Rs. 24,000 per tonne as against which it will still be netting over Rs. 35,000 based on current LME prices and the pound parity of the rupee.

Though the industry will heave a sigh of relief that its long-sought reduction has at last fructified, nevertheless, the only consolation at this juncture is that the duty cut will prevent an immediate flare-up in copper prices for January, 1988, which was very much on the cards, he said.

Indications are that users have to pay around Rs. 75 for copper in January, double the international (LME) price. In the course of a year, increase would thus be over 100 per cent since the price prevailing in December 1986 and January 1987 was Rs. 48 per kg he noted.

The government's halfhearted measure thus falls far short of industry's expectations and that copper be made available at Rs. 55,000 per tonne, he remarked.

CIL OUTPUT TARGET IN

Coal India Ltd. is all set to meet its current year's production target of 158 million tonnes with output surpassing 108 million tonnes in the first nine months of the year.

CIL sources said on January 1, 1988, the nine-month production was up by a 10.9 per cent growth over 97.68 million tonnes in the corresponding period of the last year.

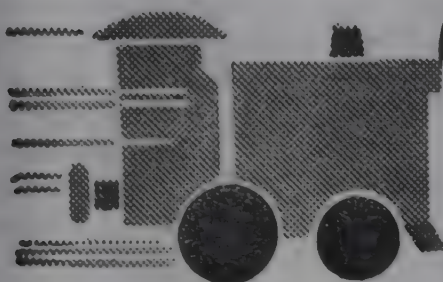
The higher production was achieved following CIL's crossing the 100-million-tonne mark in a time of 222 working days. The swing in overburden removal went up from 125.99 cubic metres to 150.12 cubic metres in the comparative period.

The sources said the increase in production in the past nine months was amply reflected in the substantial improvement in despatch which were higher by over 8.80 million tonnes to 108.20 million tonnes against 99.40 million tonnes in the corresponding period.

The growth in production offset the increase in the despatch resulting in an accretion of stocks by 2.15 million tonnes at the end of December last from 1.32 million tonnes at the beginning of the year.

With 50 million tonnes still to be despatched in the last quarter to meet the annual target, CIL despatches will have to match the growth in production, if not to outpace it, by year-end for bringing down the head stock to a reasonable level, sources said.

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NEW EXIM POLICY

More export s ops likely

The new export-import policy, which in all probability will again be drawn up for a period of three years, is expected to wear a "fresh look", with further incentives for exporters and a thorough revision of eligibility criteria for trading houses.

Indicating this at Calcutta on Dec. 31, the chief controller of imports and exports, Mr. R.L. Mishra, said the entire gamut of schemes was being reviewed with a view to simplifying procedures and incorporating necessary modifications but added that no sweeping changes were in the offing. He was quite sure that there would be no dilution of incentives available at present.

Mr. Mishra hinted that the policy would contain benefits for indirect exporters as well so that they could cater for the input requirements of direct exporters and provide them with raw materials at international prices. The list of canalised items was being reviewed and transferability of additional licences was being seriously considered, he indicated. Mr. Mishra hinted at further

modifications of the passbook scheme. The existing export-import pass book scheme had not shown the desired results, the chief controller observed. In this context, he mentioned that perhaps the time period for which the scheme had been in existence was not long enough.

Talking to newsmen after addressing a meeting of the Federation of Indian Export Organisations (FIEO), eastern region, Mr. Mishra said instead of sending licences by registered post the government was planning to issue identity cards to authorised representatives of export firms who could collect them. In fact, this system had already been introduced in Bombay and would soon be started in other cities, he said.

The chief controller noted that the exercise of formulating a fresh policy was similar to "zero-based budgeting" whereby the rationale of each and every paragraph of the existing policy was being looked into. The general consensus regarding the time frame for the new policy was three years, he said adding that

while a one-year policy lability, a five-year policy needed too many amendments and radical changes.

While revising the eligibility criteria for trading houses, the government would provide for setting select band of strong marketing organisations which could render services to ordinary manufacturers. Mishra told exporters during the meeting. This was being considered in the light of the fact that approximately 30 to 40 per cent of total exports were from the small scale sector which were not in a position to handle the marketing of their goods. Though the select export houses had been created with this objective in view, the government had not found them very effective, he observed. He mentioned that the government was awaiting the recommendations of the working group on trading houses headed by Mr. Kalyan Banerjee before drawing up fresh criteria.

Reacting to a suggestion during the meeting that trading houses should be permitted to import canalised items to step up export trade, he said it might be considered. However, importing in large quantities had its advantages. It was in fact the rationale for countertrade. Countertrade appeared attractive but it was difficult for the government to ensure that countertrade actually resulted in additional exports, he pointed out. While agreeing with exporters that incentives were necessary for increasing exports, he pointed out that there were limits to extending concessions. What was required was a change in perspective on the part of exporters who should look "abroad" and attempt to export goods which did not necessarily have demand in the domestic market.

Commenting on the balance of payments (BoP) situation, he said the strain on the BoP as a consequence of the drought would be considerable and had been estimated at the region of one billion dollars. This was mainly because of seasonal imports of foodgrains including pulses and also edible oils, condensed milk and the shortfall in exports of commodities based on cultural inputs. Though the BoP was within manageable limits, it was

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Exports register sharp rise, imports slow down

Despite deterioration in the trade balance between India and foreign countries in 1985-86 was arrested by a sharp rise in exports and decline in the growth of imports during 1986-87, according to the Reserve Bank of India's report on currency and finance.

Annual data released by the Director-General of Commercial Intelligence and Statistics (DGCI) shows that exports increased by 20.4 per cent in 1986-87 against a decline of 7.8 per cent in the previous year.

Imports also slowed down by 9.2 per cent from 11.4 per cent in the previous year.

As a result, the merchandise trade balance which had widened sharply in 1985-86 to Rs. 7,951 crores narrowed down by 5.5 per cent to Rs. 7,513 crores the next year. Exports of Special Drawing Rights (SDRs), exports were high by 8 per cent in 1986-87 as compared to a decline of 14.8 per cent in the previous year. Imports were up by 8.66 per cent as against a decline of 2.9 per cent respectively. In absolute terms, India's imports of goods and services were of the order of Rs. 20,063 crores as against Rs. 20,063 crores in 1985-86 totalling Rs. 12,550 crores in 1986-87. During the previous year the country had imported goods worth Rs. 18,371 crores and exported goods worth Rs. 10,420 crores.

There were no crude oil exports in the year. The non-oil exports grew by 22 per cent in 1986-87 as against 5.7 per cent during the previous year.

On SDR terms, non-oil exports grew by 21.5 per cent in contrast to a decline of 2.4 per cent during the previous year.

The report says India's export growth was at 0.8 per cent during 1986-87 on SDR terms was encouraging compared against the development of other countries. In 1986 exports of non-oil exporting developing countries recorded a decline, in SDR terms of 5.4 per cent against a rise of 5.4 per cent the previous year.

Exports of developing countries as a whole declined by 18.8 per cent on SDR terms a fall of 2.9 per cent in 1985. Significant increases were recorded in exports of gems and jewellery,

leather and leather manufactures, engineering goods, chemicals and allied products, raw cotton and cashew kernels.

Substantial declines in exports were recorded under mineral, fuels, lubricants and related products and tea.

Exports of gems and jewellery formed the largest single source of foreign exchange earnings accounting for nearly one-sixth of total exports in 1986-87.

Exports of readymade garments rose further by Rs. 30 crores from Rs. 1,008 crores in 1985-86 to Rs. 1,038 crores in 1986-87. The growth has been sluggish during the last two years due to the protectionist measures adopted by the importing western countries.

Exports of raw cotton increased sharply by 175.8 per cent from Rs. 66 crores in 1985-86 to Rs. 182 crores in 1986-87. Exports of cotton fabrics including yarn and made-ups increased by Rs. 60 crores or by 11.8 per

cent from Rs. 510 crores in 1985-86 to Rs. 570 crores in 1986-87.

Exports of engineering goods rose to Rs. 969 crores or by 28 per cent after a substantial decline in 1985-86. Exports of chemicals and allied products amounted to Rs. 437 crores in 1986-87 as against Rs. 286 crores the previous year, recording a growth of 52.8 per cent compared to a decline of 21.6 per cent during the previous year.

Leather and leather manufactures (except footwear) exports which have been showing a rising trend since 1982-83 recorded a steep increase of 61.3 per cent to Rs. 787 crores during the year.

The import of machinery and transport equipment, iron and steel, pearls, precious and semiprecious stones recorded a significant increase during 1986-87 while imports of petroleum, petroleum products and related materials and manufactured fertilisers showed substantial declines.

The report says that on balance imports recorded a marginal rise of 1.6 per cent as compared to 15.1 per cent in the previous year.

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NEWS IN BRIEF

BF GOODRICH DISINVESTMENT IN CHEMPLAST

The BF Goodrich Company of the US, which holds 25 per cent of the equity of Chemicals and Plastics India Ltd. (Chemplast), is disinvesting its holding (88,850 shares) by way of a rights offer to the resident Indian shareholders of the company at a price of Rs. 330 per equity share of Rs. 100 each. The offer thus works out to one share for three held.

The proposed disinvestment is in the line with Goodrich's policy of "realignment of overseas investments to current priority areas".

Chemplast was set up in the 60s with technical and equity collaboration with BF Goodrich to manufacture PVC resins. While the technical collaboration came to an end in 1977, the US firm continued its support to Chemplast, which acquired additional technology from them. As it is, it is a technical collaborator for Urethanes India Ltd., a wholly owned subsidiary of Chemplast, which is setting up a project to manufacture thermoplastic polyurethane resins.

The record date is January 25. The last date for accepting the applications is March 1.

RCF RECORD IN OUTPUT, DESPATCHES

Rashtriya Chemicals and Fertilizers (RCF) has set up new records in the fields of production and despatch last month.

An RCF press note said in Bombay on Jan. 1 that the production of ammonia and urea at its Thal unit were 79,300 tonnes (120 per cent of the target) and 1.37 lakh tonnes (124 per cent of the target) respectively.

The production of ammonia at Trombay I and V plants is 106 per cent and cent per cent respectively of the target.

The despatches of urea and complex fertilisers from Trombay were 120 per cent and 112 per cent of the target respectively, while the urea despatch at Thal was an all-time high at 1.36 tonnes which is more than 24 per cent of the target.

The production of urea and complex fertilisers during the first nine

months of the current financial year stands at 13 lakh tonnes and 4.5 lakh tonnes respectively, registering the highest-ever achieved in the field.

NAYE RESENTS DECISION TO STOP ALUM. IMPORTS

The National Alliance of Young Entrepreneurs (NAYE) has expressed its dismay over the reported Government decision to stop imports of aluminium in the current year.

In a statement, the NAYE President, Mr. S. R. Jiwarajka, said that irrespective of the fact that Minerals and Metals Trading Corporation may be incurring a loss on account of present landed cost working out to Rs. 30,740 per tonne as against the selling price of Rs. 26,949 per tonne, it must contract the balance 15,000 tonnes out of 70,000 tonnes cleared for import for the period ending March 1988 immediately to supplement the inadequate domestic supply to user industries in the small and medium sectors.

The "shortage psychosis" had already started setting in and would push the premium of metal in the market to nearly Rs. 5 per kg from the present level of Rs. 3.

The NAYE President said that as the sole canalising agency, MMTC was under contractual obligation to ensure regular supply of the metal to the consuming industry and it should enter into necessary arrangements well in advance instead of creating a situation which was fast becoming "paralytical".

28 ILS, 63 LIS ISSUED DURING OCTOBER

During October, 28 licences and 63 letters of intent were issued. One licence was revoked, while six letters of intent, were cancelled and four lapsed.

Industry-wise, metallurgical industries and drugs and pharmaceuticals got five licences each, electrical equipment four, cement three, commercial equipment, chemicals, sugar and leather two each, telecommunications, transportation and timber products one each.

Category-wise, 14 of the licences were for setting up new undertakings, 10 for manufacturing new ar-

ticles and four for effectual expansion.

Industry-wise, 14 of the intent were for chemical eight for electrical equipment each for metallurgical and sugar, two each for vegetable oils and rubber, a for transportation, industry mechanical engineering, industrial instruments, food industries, drugs, pharmaceutical and miscellaneous.

Category-wise, 40 of the intent were for setting up undertakings, 15 for manufacturing new articles, and eight for expansion.

VENEZUELA IS SIXTH IN RESERVES

Venezuela's petroleum showed cautious optimism for 1988 oil market and projected to earn slightly more oil income year than it did in 1987.

Oil officials said they Venezuela's proven reserves to 58 billion barrels, which rank it sixth worldwide in oil reserves.

In 1986, when overproduced prices to plummet, it averaged 13.90 dollars per barrel on exports averaging 1,508 million barrels per day.

Oil income reached 7.2 billion dollars and petrochemicals added another 800 million.

"In 1988, we hope for an income of between 9.6 and 10 billion dollars" based on daily exports of 1,520,000 barrels costing 16.70 dollars each, Dez Grisanti said.

Venezuela's current OPEC quota is 1,571,000 barrels of crude oil per day. The cartel's effective ceiling is 16.6 million barrels per day.

Prior to the December OPEC conference, when member nations fixed their quota system and dollar per barrel benchmark, excess output was around 10 million barrels per day.

"Depending on the development of the market, by next June we could increase the ceiling or it is more likely, have some price increase," Hernandez said.

tion soon for Gujarat's petrochem unit

on Industry Minister, Mr. Rao, recently said the Centre soon give formal sanction to the proposal by the Gujarat Government to set up a Rs. 7,000-crore petrochemical complex in the State. During a Gujarat business conference, organised by the Gujarat Chamber of Commerce and Industries in Ahmedabad, he said his delegation had gone through the proposal. He had discussed the matter with the Minister, Mr. Amarsinh Chauhan.

Rao said in view of the present economic crisis in the country, the private sector industries had to be given priority with proposals to set up power generation plants. The Government was examining the proposal and would take an appropriate decision in this regard.

Regarding the industrial development in Gujarat, he said business enterprises in the State have a right to ask the Government to sponsor public sector projects for development of downstream industries.

ended back

Regarding the Andhra Pradesh Government's plan for reversing the industrial development in the State, he said the State was second in industrial development in the country in terms of its Chief Minister's tenure, now, it was relegated to third position.

The country was passing through a severe drought and the Centre would spend at least Rs. 3,000 crore to combat it, he said.

Coming to the comparison made by one of the speakers about India's small export performance as compared to smaller nations like Taiwan and Korea, he said to boost exports, India had to imbibe discipline like developed countries, as production could not be increased in the absence of technology.

Regarding energy and natural gas, he said they have to be used extensively. The present installed power generation capacity, he said reacting to the Minister's plea to allow the use of gas for power stations, was insufficient. Regarding the functioning over the function, the Minister said the State had slowed its industrial growth, due to severe drought for the fourth consecutive year. Referring to the textile mills, he said the sick

mills could be saved with talks between the mill owners, employees and the Government.

Mr. Arvind Mehatlal, Industrialist, urged the State Government and businessmen to evolve a new economic strategy for the balanced growth of the State.

ONGC FOR INTEGRATED ENERGY PLAN

Introduction of the holding company concept for the energy sector, moving away from dependence on oil, acceleration of exploration effort and exploration in basins abroad and setting up of a national gas grid, are among the many aspects of the integrated energy plan mooted by the Oil and Natural Gas Commission (ONGC) for meeting the needs of the country in the coming years.

In a study on the "future energy options" the ONGC maintains that the volatility of energy markets (especially oil) necessitates the formulation of an integrated energy plan. This is necessary to subserve the medium and long term needs of different sectors.

India's energy programme administration, the study notes, should follow a holistic approach instead. For this purpose, it suggests the creation of an energy management cell at apex level for a co-ordinated approach to policy formulation as also for monitoring energy projects "for achieving the desired level of energy mix."

About the holding company concept the study explains that capital formation in energy-related areas over the past three decades has been immense. The need for optimum utilisation of vast resources in various sectors of energy cannot be over emphasised. Therefore, "introduction of the holding company concept for the energy sector offers good scope. This concept needs to be speedily put into practice."

Similarly, the study pleads for increased resources for the energy sector for attaining self-reliance. The world's continued dependence on oil with 75 per cent non-replaceable end use and fluctuating oil prices, has made it imperative for India too to intensify its exploratory efforts. Upgradation of reserves through in-

tensification of efforts, taking advantage of depressed market conditions for exploration services, is "a matter of priority."

It is pointed out that given the geopolitical environment, access to oil and energy resources is vital for India. To ensure security of supply and addition to present reserves, a deliberate strategy through bidding for exploration blocks in basins abroad should be pursued with vigour.

Likewise, the ONGC study pleads for a national gas grid to be set up in a phased manner for optimal utilisation of "this energy source." The grid, it is contended, will foster quicker economic development, reduce pressure on imported oil besides reducing regional imbalances.

While the gas grid is indeed necessary, the need for a deliberate strategy of moving away from dependence on oil cannot be ruled out. In fact, it assumes national priority.

Eighty-five per cent of the oil resources, the study notes, are consumed by the transport and domestic sectors alone (56 per cent transport and 29 per cent domestic).

The growth rate of demand for oil related products in the industry and transport sector is fast outstripping the planned demand supply balance. A deliberate strategy, therefore, to switch over to non-oil based resources must be pursued as a matter of great urgency.

PONDY OIL HUNT WORK FOR SOVIET FIRM

Oil exploration work in Pondicherry area has been awarded to a Soviet company, the Union Minister of State for Petroleum, Mr. Brahm Dutt, said on Dec. 31.

He stated this to Pondicherry Public Works Minister, Mr. V. Vaithyalingam, when the latter called on him at Pondicherry.

Mr. Vaithyalingam, told later that the Union Minister had told him that a preliminary survey of the area had revealed the existence of hydrocarbon reserves.

The Union Minister also agreed to supply 50,000 cubic feet natural gas a day from the gas available at Cauvery Basin for setting up a gas-based power plant at Karaikal. He also accepted another proposal to supply gas from oil wells in the Godavari region for a power plant at Yanam, Mr. Vaithyalingam said.

Heavy outlay on petrochemicals projects

The outlay on petrochemical projects in the public, private and joint sectors in the next few years may easily exceed Rs. 4,500 crores even without taking into account the schemes that may be taking shape in the Eighth Plan if decisions are taken by the Central Government regarding the promotion of new complexes in Vizag in Andhra Pradesh, Saleempur in U.P. and Mangalore in Karnataka.

The projects based on natural gas in Maharashtra, the aromatics and other projects in Manali, near Madras and new units coming up in Hazira alone may require an investment of about Rs. 3,000 crores. The arrangements for the Haldia project involving capital expenditure of nearly Rs. 1,500 crores are still being finalised. While the Maharashtra petrochemical complex will be taking shape by 1989-90, numerous other individual units will be arriving on the scene in Manali in Tamilnadu and Udhyog Mandal in Ke-

rala and different centres in Gujarat.

Three major complexes

The linear alkyl benzene project of Tamilnadu Petro Products and Reliance Industries have already commenced working, while the purified terephthalic acid plant of RIL also is undergoing trial operations, and the Manali petrochemical complex and Kamar Petro Chemicals will be having an outlay around Rs. 125 crores. SPIC Fine Chemicals too, will be securing resources for about Rs. 40 crores for the detergent project. The issue of equity capital to the investing public by all these units may be contemplated after good progress has been made.

It is expected that definite decisions about executing the aromatic project by Madras Refineries in co-operation with other interests will be taken up shortly as it is being examined who should be the joint promoter and how the whole scheme costing Rs. 840 crores should be

implemented. Even without projects coming up, there is a big increase in production of lactam, DMT, PTA and other intermediates required for production of synthetic fibres of different types. It will be possible to displace imports of several petrochemicals significantly and also relieve the shortage of polyvinyl chloride and ethylene when the new schemes of RIL and other interests emerge. But it is probable that there will emerge in some direct competition with a big increase in the production of synthetic fibres with many existing producers raising their capacity to optimum levels to take advantage of the new policies of the Government.

In view of the massive investment in the creation of new capacities in many sectors, it has been ensured that redundant capacity will not be created in the process of growth in demand for various products is not also inhibited by the levy of heavy import and export duties.

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C spots significant prospects in south

and Natural Gas Commission identified a few "significant commercially exploitable prospects in the southern region, according to the Union Minister of State for Petroleum and Natural Gas, Mr. Brahm Dutt.

At a press conference in Madras, he said there are five onland and three offshore areas in the Krishna-Godavari basin, three onland and two offshore prospects in the Cauvery basin which have been recognised so far as being commercially exploitable.

He listed the areas as follows: Krishna-Godavari basin: Narsapur, Tatipaka, Pasarlupudi, and G-1, G-2 and GS-1 (onland); G-1, G-2 and GS-1 structures (all offshore); and Cauvery basin: Narimanam, Kovilkalappal and Bhuvanagiri (all onland), and Py-1 and PH-9 structures (offshore).

For these prospects, ONGC has put these areas to "early production" so that "early production" is a technique designed to hasten the decision on commercial exploitation by assessing the commercial potential soon after production testing.

The Minister catalogued the areas to "early production" as follows: Narimanam, Kovilkalappal and Bhuvanagiri in the Cauvery onland basin; and Kaikalur in the Krishna-Godavari onland basin.

These, two wells in the Narimanam belt, and a well each at Kovilkalappal and Bhuvanagiri are under "early production", accounting for a total output of 82.40 tonnes per day which is transported by tankers to the Madras Refineries Ltd. Narimanam-I yields 14.50 tonnes per day, Narimanam-III 49.90 tonnes, Kovilkalappal-IV eight tonnes and Bhuvanagiri-II 10 tonnes.

These wells produce associated gas of the order of 19,000 cubic metres per day at the Narimanam structure, 13,500 cubic metres at Kovilkalappal and 13,000 cubic metres at Bhuvanagiri.

At the associated gas from these wells is being flared now, though the Tamil Nadu Electricity Board has expressed willingness to take the gas from Kovilkalappal-I and an agreement has been signed with Indian Steel Rolling Mills, Nagapatnam, for gas from the Narimanam-I. The pipeline to supply gas to

this firm is likely to be commissioned by the end of this month, the Minister indicated.

In all, the prognosticated reserves are as follows: 760 million tonnes oil and oil equivalent gas in the Krishna-Godavari basin, 370 million tonnes in the Cauvery basin and 250 million tonnes in the Andamans. So far, an expenditure of Rs. 663 crores has been incurred on exploration and allied activities in the Krishna-Godavari basin since work commenced there.

Similarly, the aggregate spending has been of the order of Rs. 260 crores on the Cauvery basin and Rs. 160 crores in the Andamans. In the next two years, an additional outlay of Rs. 300 crores will be spent on the Krishna-Godavari basin, and Rs. 200 crores on the Cauvery basin, the Minister added.

Oil has been recently struck at GS 16-8 offshore structure at a point south-west of Amalapuram in the Krishna-Godavari basin, thereby raising hopes of a highly prospective field in this structure. The yield from this well is now of the order of 400 barrels a day with an associated gas component of 25,000 cubic metres a day.

The first well to be put to "early production" in the Krishna-Godavari offshore region, namely GS 16-2 may be commissioned next year, Mr. Brahm Dutt said.

To speed up the use of freeflowing gas in the Krishna-Godavari basin, ONGC has entered into negotiations with the Italian firm, Spie-Capag, which is already associated with the H-B-J pipeline work. If the negotiations fructify, the planned pipeline in the Krishna-Godavari basin may be ready towards the end of May this year.

Turning to other subjects, the Minister said plans are being drawn up to raise the country's existing LPG bottling capacity by 24,000 tonnes before the end of this year, when "another phase of expansion will start". Two LPG bottling units, under Bharat Petroleum, will be set up in the southern region before the end of 1988, one at Tuticorin and the other at Trivandrum.

About increasing the refining ca-

capacity in the country, Mr. Brahm Dutt said the Centre is considering the setting up of a refinery in the public sector in Assam, because the private sector has not shown any interest to scale up the existing capacity by two to three million tonnes per annum in terms of the Assam accord.

Asked about the proposed aromatics complex at Manali near Madras city, he said the Centre has given the "first-stage clearance", thereby signalling an approval in principle for the Rs. 800-odd-crore project. He declined to be drawn into any discussion on the choice of a copromoter and the reasons for the delay in the commencement of work.

The Minister was speaking to newsmen after formally commissioning a mini-super computer at the ONGC office in Madras.

TEST-DRILLING IN RAMANATHAPURAM

The Oil and Natural Gas Commission (ONGC) will start "test-drilling" in Pudhumadam — north, near Uchchipuli, in Ramanathapuram district, by 1989, according to Mr. Brahm Dutt, Union Minister of state for petroleum.

He told newsmen in Rameshwaram, that in the Palk Strait eight wells had been drilled already, and the ninth well was being drilled. Drilling in the Pandikammai area had revealed that crude was available in the area at a depth of 1050 metres.

He said a decision to drill wells had been taken following symptoms of availability of petroleum crude in that area. If the petroleum crude was available, the commercial production will start by 1990. He said Rs. six to ten crores had been allocated in the seventh-five-year plan for oil drilling in the area.

The minister, who flew over the area in Palk Strait, where crude had been struck, said the oil had been struck in Nedutheevu and Pesalai in Sri Lanka. The oil finding in the Sri Lankan waters had encouraged us to drill for oil in the Indian shore.

New Reliance company at Hazira complex

The management of Reliance Industries has decided to set up a new company styled Reliance Petrochemicals to undertake a massive petrochemical project at the new growth centre at Hazira (Gujarat). It was originally planned to take up this project in Reliance Industries itself. But after careful consideration, the recent decision appears to have been taken by the company's management.

The project cost of the Hazira complex is being finalised. It is expected to be of the order of about Rs. 1,200 crores in the first phase. Ultimately, the project is expected to involve an outlay of around Rs. 2,000 crores.

The modalities of financing the project are being finalised and are expected to be announced soon. Indications are that the initial capital of the new company will be around Rs. 100 crores.

The policy of the Reliance management has always been to keep the interests of its shareholders, debentureholders and fixed deposit holders in mind. In continuation of this policy, it is trying to obtain permission from the Controller of Capital Issues to offer the shares of the proposed company to its shareholders, debentureholders and fixed deposit holders of Reliance Industries on a preferential basis.

The company has already been allotted land exceeding 280 hectares at Hazira for the petrochemical complex. Work on the project has already commenced and so far a sum of about Rs. 40 crores has been spent on the project.

As is known, the petrochemical complex will initially have different units for manufacturing high density polyethylene (HDPE) at an annual capacity of 50,000 tonnes, a PVC plant with an annual capacity of 1,00,000 tonnes and a caustic-soda-cum-chlorine project at an annual capacity of 78,000 tonnes of caustic soda and 66,000 tonnes of chlorine. The new complex will also have other units, depending upon government clearances.

The decision of the management to set up a new company to implement the petrochemical complex at Hazira is expected to prove beneficial to share holders of Reliance Industries. This means that the

company will not be required to raise additional capital on its own.

Reliance Industries is a widely-held company with 82 per cent of the equity shareholding in the hands of the public, and with 12 lakh shareholders who may be classified as small. The company made a massive rights issue of Rs. 198 crores to its shareholders in shares of Rs. 10 each at a premium of Rs. 50 per share. Even after this recent rights issue, the company's equity base is considered to be quite strong in relation to its gross block and its annual turnover.

The company's linear alkyl benzene (LAB) plant with an annual capacity of 60,000 tonnes per annum which was commissioned in November 1987, has been stabilised, and according to the company's management the product has been well received in the market by producers of synthetic detergents. Its PTA project at Patalganga (Maharashtra) has also started production.

With the full benefits of LAB and PTA projects accruing to the company, the ratio of operating profits to sales is expected to rise to about 25 per cent in 1988, and the ratio of debt to net worth to decline to about 0.54:1. All these benefits will be available to existing shareholders.

SELF-SUFFICIENCY IN PETROLEUM BY 2000 A.D.

With a proper planning, exploratory development and production efforts, the north-east alone can make India self-sufficient in petroleum production before the end of the present century.

But what has been discovered so far is estimated to be only 10 per cent of the total potential of the region, according to Oil and Natural Gas Commission (ONGC) sources.

From the exploration point of view, the north-east is divided into three regions the upper Assam Valley, Naga Hills and the Tripura-Manipur region. Although nearly 90 per cent of the oil and gas finds are in the Upper Assam valley, the Tripura-Manipur region has a very large potential.

According to the sources, the prospects for Tripura-Manipur re-

gion are so bright that it may be out to be the most prospective in of India with giant and giant oil and gas fields. So far only one per cent of the oil and gas potential in this basin has been ascertained.

In the upper Assam Valley, about 20 per cent of the total hydrocarbons potential in the region has been realised. The potential to be realised is estimated at about 10 million tonnes of oil and oil soluble gas.

In the Naga Hills, the Shuppen between Naga Thrust and Disang Thrust is the most prospective.

Calling for top priority to be given to the north-east region, the sources say that the risk involved is insignificant. With a application of suitable oil recovery techniques, the present average recovery factor, now at 25 per cent, can be raised to 35 per cent. This itself would add considerable amount of recoverable oil. The recovery rate can also be raised by having two or more wells per acre well to the extent possible. Most of the north-east region gas fields are of the multi-layer type. At present, the wells are producing from a single horizon only.

The sources say that a national policy to utilise the natural gas available in the country is required, both for conventional purposes and also as a substitute for oil and petroleum products. As part of this strategy, a gas grid should be laid down in northern India as a top priority.

PLASTICS BODY SEEKS EXCISE RELIEF

The All India Federation of Plastic Industries has urged the government to raise the excise exemption limit for footwear from Rs. 60 to Rs. 100 in view of the rise in costs of footwear inputs.

Federation president M.R. has said in a press release that the present minimum workable price is Rs. 100 per pair and a 20 per cent excise on it would make the price beyond the reach of the common man.

Three Co.s bid for IOC refinery

international companies — Oil, Chevron and U.O.P. all the US, are in race to win the bid to help Indian Oil Corporation (IOC) set up the country's first hydrocracker unit at Guwahati refinery at an estimated cost of 520 crores.

According to official sources, the bid to set up the hydrocracker unit has recently been cleared by the Cabinet following its approval by the Public Investment Board.

The proposed unit, to be set up within five years from now, is needed to distill the heavy ends that will become available following the commissioning of the Refinery.

IOC has already begun on the expansion of the Gujarat and Madras refineries to process additional quantities of crude oil. The expansion of Gujarat Refinery from 9.5 million tonnes per annum to 12.5 million tonnes will result in the utilisation of the additional two million tonnes of Gujarat crude.

The expansion of Mathura Refinery from six to 7.5 million tonnes per annum would help in meeting the growing demand of petroleum products in the north-west.

At present, refineries in the country use FCCU (fluidised catalytic cracking unit) to distill the crude oil which is processed into low distillates — LPG, petrol, naphtha, middle distillates — aviation turbine fuel, kerosene, diesel, and heavy distillates — furnace oil and other fuel

oil. The hydrocracking process, which is milder than FCCU, will be used to further crack the heavy ends to produce more light and middle distillates. In India, a major percentage of petroleum products is in the shape of middle distillates.

Meanwhile, the six refineries of IOC have processed seven per cent of the crude oil during the first six months of the current financial year as compared to the same period last year. The Mathura and Guwahati refineries had processed only 17 per cent and eight per cent more crude respectively during the past six months.

In fact, for the past two years, IOC refineries have been achieving

over 100 per cent capacity utilisation because of better preventive and predictive maintenance.

200 CRORE FOR CAUVERY BASIN

Mr. Brahm Dutt, Union Minister for Petroleum and Natural Gas, disclosed on Dec. 31 that a sum of Rs. 200 crore would be spent on oil exploration in the Cauvery basin in the next two years of the seventh Five-Year Plan.

The feasibility of establishing an oil refinery in the basin would be considered during the eighth Plan and, in the meanwhile, exploration work in the basin was being intensified.

Mr. Brahm Dutt, accompanied by Mr. K. Anjaneyan, Regional Director of the Oil and Natural Gas Commission, Madras visited Bhuvanagiri and Komarakshi in South Arcot and inspected oil exploration work.

Since the commencement of the exploration work here, a sum of Rs. 265 crore had been spent.

The striking of oil and gas by the ONGC at Bhuvanagiri in South Arcot, the first in the Ariyalur Pondicherry sub-basin of the Cauvery basin, had added a new dimension to hydrocarbon prospects in the area, he said.

In the Cauvery basin, spread over a total area of 48,000 sq. km. in Tamil Nadu and in Pondicherry the estimated resources of the basin are estimated to be about 370 million metric tonnes (130 million metric tonnes onland and 240 million metric tonnes off shore).

Already, the Narimanam and Kovvilkalappal prospects were under early production system and more than one lakh barrels of oil had been supplied to Madras Refineries and to the Kovvilkalappal structure.

Mr. Brahm Dutt was happy that the Tamil Nadu Electricity Board had come forward to set up a five mega watt gas turbine from the natural gas struck in two wells at Kovvilkalappal village.

SEMINAR ON ENERGY ECONOMY IN ELECTROCHEMICAL INDUSTRIES

National Seminar on Energy Economy in Electrochemical Industries will be organised in Madras

by the Society for Advancement of Electrochemical Science and Technology (SAEST), Madras Chapter in collaboration with Central Electrochemical Research Institute (CECRI), Karaikudi and DCW Limited, Sahu-puram on 27th and 28th January, 1988.

Sri M.V. Arunachalam, Minister for Industries, Government of India inaugurates, Prof. Dr. K.I. Vasu, Director, CECRI, Karaikudi presides.

Energy crisis is engaging world-wide attention. This problem is all the more serious in Indian context because of the acute power shortage. Power is one of the main raw materials for many electrochemical industries and any attempt made to lower energy consumption and increase efficiency is worth nothing. Energy saving in electrothermal and electrometallurgical industries will also benefit the nation as a whole. Many of the major electrochemical industries in the country are devising and adopting various means/techniques to save energy and increase output.

Keeping the above objectives in mind, this national seminar is being organised to focus all the new and important developments which will immensely benefit both big and small electrochemical industries.

During the deliberations number of research papers, case studies and cost benefits will be presented on the theme energy conservation aspects.

It is expected that this national meet will give an opportunity to exchange views on the energy economy to be adopted in future between the electrochemical industries in India & the research institutions like CECRI.

For further particulars please contact: Sri S. Ramamurthy, Secretary or Sri S. Chandrasekaran, Vice-Chairman, SAEST Madras Chapter C/o CECRI Madras Unit, CSIR Complex, Taramani, Madras-600 113 (Phone: 412068 or 413856) OR Sri P. Hariharan, Liaison Executive, DCW Limited, 645, Anna Salai, Madras-600 002. (Phone: 477 752).

As the number of participants cannot be very large, those interested to participate in the Workshop are requested to kindly send a letter confirming participation enclosing a D.D./Cheque for Rs. 250/- in favour of 'Council for Leather Exports' at 'Leather Centre', 53, Sydenham Road, 'Periampet', Madras-3.

Meetings & Conferences

WORKSHOP ON LEATHER CHEMICALS

The Council for Leather Exports, in close association with the Ministry of Commerce, is organising a Workshop at New Delhi on 9.2.1988 on the subject of 'Chemicals for Leather Industry'. Though the leather chemical industry within the country has grown over a period of time, and supplies quite a good quantity of chemicals to the leather industry, there have been reports from the leather makers that the quality of local chemicals is not good enough for making high quality leathers and their prices are also higher than imported chemicals. As the leather industry is poised for substantial expansion during the next decade, primarily based on imported raw material, it is felt an opportune time to review the existing situation with regard to the availability of leather chemicals in the country and measures required to be taken to ensure upgradation of the existing facilities for production of chemicals of the requisite quality at competitive rates. The Workshop is expected to focus attention on all these matters. The representatives of the DGTD, Ministry of Chemicals, Ministry of Commerce and Industry and the CLRI will be participating in this besides the leather chemical manufacturers.

The Workshop will be inaugurated by Shri N.D. Tiwari, Hon'ble Union Minister of Finance and Commerce on Feb. 9.

In order to bring out the advancement achieved by the Indian leather and leather products industry in the past few years and the importance of chemicals in making the right type of leather, it is proposed to organise a small display of various type of leather and leather products produced in India.

SEMINAR ON ACRYLIC FIBRE: OPPORTUNITIES IN EASTERN INDIA

To highlight the scope of using acrylic fibre in the textile industries of Eastern India and also to focus attention on the prospects of developing knit-wear and small

scale industries of Eastern and North Eastern India, a seminar entitled "Acrylic Fibre: Opportunities in Eastern India" was organised by IPCL, Calcutta, on 3rd December, 1987, at Hotel Oberoi Grand, Calcutta.

Mr. P.R. Singhvi, Regional Manager, IPCL, Calcutta, welcomed the delegates and mentioned that Eastern India has been identified as one of the potential markets of acrylic fibre. IPCL's effort in creating awareness about the scope of developing knit-wear and small scale industries using acrylic fibre for the last several years has now started yielding result. He felt confident that the deliberations of the seminar would positively contribute in developing acrylic fibre based small scale units in the region.

Mr. P.K. Sarkar, Secretary, Deptt. of Commerce & Industries, Govt. of West Bengal, in his inaugural address stated that West Bengal, once upon a time, was in the forefront of hosiery industry in the country. He informed that the potential of acrylic fibre in developing hosiery and knitwear industries of the region should be exploited to the fullest extent. He also stated that State Govt. would definitely consider tax relief measures provided a concrete proposal is placed before the Govt. for the development of acrylic fibre based units in the State. He in fact, suggested a working group to be formed inducting representatives from the industry as well as IPCL, for suitably advising the Govt. in this connection.

Mr. B. D. Chatterjee, General Manager (Marketing), IPCL, in his opening remarks, highlighted the potential scope of using acrylic fibre in textile industries of this region. He also informed the participants that IPCL would soon introduce a new type of acrylic fibre in the market under the brand name of SUP-ACRYL. This new fibre, with a plant capacity of 12,000 MTs. per annum, to be produced in technical collaboration with world famous DuPont, USA, would offer additional end-product quality in terms of sweat transport, comfort, softness and other aesthetic values.

Mr. S.N. Hada, Chairman, Hada Group of Industries, Calcutta, men-

tioned that Eastern India consumes about 3570 MTs. of acrylic made end product every year. The entire quantity of material is supplied from Delhi and Ludhiana. Whatever little quantity of yarn is spun in West Bengal to Ludhiana for want of local spinner. He added that 1.0% octroi local sales tax and 3.0% p.u. tax on acrylic fibre make yarn spinning least profitable compared to Ludhiana where there is no tax on such fibre. He requested Govt. of West Bengal to take relief measures, so that acrylic based industry develops in the region.

Mr. S.M. Mehta, Chief Manager (Marketing), IPCL, in his paper on "Opportunities with acrylic" highlighted the scope of this fibre in the textile industry of the country. He also pointed out the benefits of using Supacryl E as a component fibre in bulky hosiery and handknitting yarn application.

Mr. S. K. Mukherjee, President, West Bengal Hosiery Manufacturers Association and Mr. G. L. Agarwal, President, West Bengal Hosiery Association also addressed the seminar and highlighted the present prospects of hosiery industry in West Bengal.

Inaugural session was followed by two technical sessions where representatives from IPCL presented following papers:

Technical Session I

Chairman Dr. S. M. Chatterjee, Principal, College of Textile Technology, Serampore and Chairman, Hada Group of Industries, Calcutta, presented the following papers:

1. Promotion of Small Scale Industries by using Acrylic Fibre: Shri D. K. Chattopadhyay, IPCL.

2. Developments in Acrylic Fibre Wears: Shri N. N. Choksey, IPCL.

Technical Session II

Chairman Dr. S. R. Rangarajan, Director, Indian Jute Industries Research Association, Calcutta, presented the following papers:

1. Spinning of Acrylic Fibre Modified Cotton System: Shri Asudani, IPCL & Shri J. M. Datta, IPCL.

2. Dyeing of Acrylic Bulky Yarn: Shri A. Bose, IPCL.

The seminar concluded with a vote of thanks proposed by Mr. N. K. Harajani, Dy. Sales Manager,

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Highlights in Chemical Technology (Part 1)

HYDROTHERMAL TECHNOLOGY FROM BATTELLE LABORATORIES RECOVERS METALS FROM INDUSTRIAL WASTES

Recovering industrial wastes for valuable components is not a new idea. Hydrothermal technology, which has been used by the metals industry for years to separate metals from ores. But Battelle Laboratories (Columbus, Ohio) has come up with a unique method, that it reports will make use of a hydrothermal process to recover substances from industrial wastes, then market them and recycle them back into the manufacturing process. The new technology is available for licensing to industry.

Hydrothermal processing uses the chemistry of hot water alone with other inorganic or organic materials under pressure. Basically the process involves heating an aqueous solution containing a solvated metal species in a closed vessel above 100°C, but less than the critical temperature of water, for a period long enough to promote the precipitation of the desired product. By manipulating the solution chemistry of hot water under pressure, the physical, chemical and electronic properties can be engineered for specific applications.

Battelle reports that the new process is both versatile and flexible. By modifying the materials, one can convert the heavy metals to marketable products for recycling and also minimize wastes. For example, electric arc furnace dust is used by Battelle to extract such heavy metals as copper, lead and cadmium, which can

be used as pigments or raw materials for pigments. Ferric oxide from another electric arc furnace dust material can be recycled, converted into a ferric oxide pigment, or used as a raw material for ferrites.

The process could prove valuable in treating aqueous effluents from metals industries. Such effluents contain heavy metals that can be precipitated by the hydrothermal process, recovering chrome, nickel, cobalt, cadmium and lead that can be marketed or recycled. With this objective, Battelle is building a 25 tons/year pilot plant that uses the new technology. The unit is slated for completion in mid 1988. A Waste Treatment Utilization Centre is also being planned by Battelle.

Battelle's hydrothermal process, the Company claims can also recover noble and non-noble metals from spent catalysts. Applied to the petroleum industry, the hydrothermal technology can be used in future for recovering oil from tar sands, producing catalysts and desulfurizing petroleum coke. (*Chem. Wk.*, 9/30/87 p. 15).

A POLYANILINE-BASED MINI BATTERY COMMERCIALIZED IN JAPAN

Electrically conductive polyaniline is at the anode of a battery commercialized in Japan last September by Bridgestone Corporation and Seiko Electronic Components Ltd. (both of Tokyo). Initially the firms are marketing the rechargeable battery, whose cathode consists of a lithium-aluminum alloy, in the shape of a coin. It is 20 mm in diameter and 1.6 mm thick and weighs 1.7 gm. Priced at about \$1.40, the batteries are tar-

getted as power sources for memories of personal computers, and for watch/calculators in combination with solar cells.

The polyaniline developed by Bridgestone, is inherently electroconductive, without fillers. Because of its undisclosed 'Special Structure' and purity, it is so stable that the companies are projecting a battery life of at least 5 years. (*Chem. Eng.*, 2/28/87, p. 9).

A NOVEL BATTERY WITH LONG LIFE AND MINIMAL MAINTENANCE DEVELOPED IN AUSTRALIA

A unique battery requiring minimal maintenance but promising indefinitely long life is being developed by researchers Skyllas Kazakos and Miron Rychcik at the University of New South Wales, Sydney, Australia. They have already negotiated an agreement under which West Australian vanadium miner Clough Agnew (Perth, West Australia) will market the battery worldwide. This new rechargeable battery is an enhanced version of the redox flow-cell concept wherein two redox solutions are pumped separately through adjacent half cells.

Up to now, indicate the researchers, such solutions have contained cations of different elements (e.g. iron and chromium) which can cause contamination problems across the membrane separating the cells. In the new University of New South Wales version, the two solutions both contain vanadium, differing only in their oxidation states, so diffusion creates less of a problem. (*Chem. Eng.*, 9/28/87, p. 9).

NEW PHOTOCHEMICAL REACTOR DEVELOPED

Use of a photochemical process to make materials for electronic devices such as solar cells and microchips may spread commercially as a result of work at the University of Delaware's Institute of Energy Conversion. Under sub-contract to Solar Energy Research, IEC chemical engineers have developed a new photochemical vapor deposition reactor that uses UV light to initiate the reactions that form thin layers of semi-conductor materials. Earlier reactors of this type required frequent shutdown and cleaning because films having grown inside the reaction chamber also formed over the window that admitted the light.

The new reactor designed by Richard E. Rochelean, manager of the reactor design and analysis laboratory and Scot C. Jackson, a former IEC associate engineer, employs a flexible transparent Teflon curtain to divide the reactor into two chambers, the top one containing inert or reaction -- inhibiting gases. Reactant gases flow through the lower chamber over the temperature controlled substrates on which the film is grown. The design prevents window coating and the Teflon curtain does not introduce impurities. (*C & EN*, 5/18/87, p. 21).

A TEST PROCEDURE FOR ESTIMATING PRODUCTIVE LIFE OF LUBRICATING OILS

A test procedure for determining the high temperature anti-oxidant capability (HTAC) of motor oils -- an important property, since oxidation causes motor oils to lose their lubricating ability -- has been developed by Ford Motor.

The test involves determining how

long it takes for hexadecane -- a common component of motor oils -- to be oxidized by continually adding hydroperoxides to a stirred flow reactor at 160°C. The conditions closely simulate the oxidizing conditions in a working engine, reports Milton D. Johnson, a Ford staff engineer. From his research he has come to the conclusion that two HTAC mechanisms predominate in the base oils from which motor oils are made. Some base oils prevent oxidation predominantly by trapping free radicals, while others decompose hydroperoxide before it forms free radicals.

Johnson also found that some oxidation inhibitors found naturally in base oils were acting initially, and others were activated only after their formation during the oxidation process. Performances of such antioxidant additives as zinc dialkylthiophosphates depend heavily on the composition of the base oil, reports Johnson. He concludes that HTAC testing provides a means of fingerprinting base oils. (*Chem. Wk.*, 10/21/87 p. 48).

MICROBIAL CONTROL IN FOULED FUEL SYSTEM ACHIEVED BY A NEW MICROBIOCIDE

A fuel preservative which can be used to control microbial infection in fouled fuel systems as well as to prevent bacterial and fungal growth in fuel tanks, storage tanks and moving streams of fuel has been launched in Europe by Rohm & Haas (U.K.). The Product's trade name is Kathon FP 1.5. It is a microbiocide recommended for use in liquid hydrocarbon fuels, including kerosene, heating oils, diesel fuels, other middle distillates, coal slurries and petrochemical feedstocks.

Bacteria and fungi can cause a range of problems if allowed to con-

taminate fuel systems. For their growth can result in the formation of dense mats at the interface of fuel and water, leading to fuel filters, etc. and fuel turbidity problems. Additional aerobic bacteria in fuel may form corrosive acids, damaging tanks.

The new microbiocide is designed to provide rapid long lasting control -- field trials have shown a reduction of recontamination from one month to a year, depending on the system. In addition, microbial growth is measurably reduced within 24 hours and control of microbial growth achieved within 24 hours of the introduction of the material, claims the company. (*Chemist*, 8/1987, p. 19).

DIRECT ONE-STEP CONVERSION OF NATURAL GAS TO METHANOL PATENTED FOR COMMERCIAL EXPLOITATION

Methane usually burns in the presence of oxygen to give carbon dioxide and water. By limiting air or oxygen, however, methane can be oxidized partially to methanol. Experiments with reaction temperatures up to 1000°C, methane pressures, and oxygen concentrations, researchers at the University of Manitoba, Canada, found a blend of reaction conditions that gives a yield of methanol of nearly 8%.

The new process is reported to give a yield of methanol up to 10% more economical than the conventional two-step syngas process. It is not limited to large sources of coal or natural gas -- remote or offshore gas wells are now potential sources of methanol.

The researcher Hyman Gold has already received a US patent for the process. He reports his new process will make possible production

le methanol at an eco-
e to make it compete with
fuel.

l is an attractive alterna-
ol because it burns much
ly with a lower burning
e disadvantages are that
and it dissolves the sold-
in petrol tanks. It also has
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ays, this could play havoc
s fuel pump. In spite of
pected that as the world's
s dwindle, the problems
weighed by the prospect
ol as a cheap alternative.
em is how cheaply meth-
e produced. The new pro-
rhaps can make this
(*New Sci.*, 9/17/87, p.43).

EIGHT POLYMER OLYTE MADE

weight polymeric electrolyte
that may have application in
e, high-energy density bat-
s been developed by pol-
entist George T Davis and
rs in the electrical polym-
b at the National Bureau of
s (NBS) of USA.

ectrolyte consists of inter-
ng polymer networks of the
uous phases, like a sponge
es. One phase is a cross-
oxy that provides strength
ensional stability, the other
molecular weight poly (eth-
ide) with dissolved salt that
gh conductivity.

ners that contain dissolved
an important class of poten-
tolyte materials because
inert to lithium, the highest
at can be used in batteries
y can be fabricated with thin
ne work was partially funded
Office of Naval Research and
it has been applied for. (*C &*
5/87, p. 25).

INDUSTRIAL USES OF OXYGEN ENRICHED AIR

Oxygen-enriched air can be
extensively used in industry with
several advantages. A recent issue
of Chemtech journal gives several
interesting applications of oxygen-
enriched air in industry and labora-
tory.

According to Chemtech, oxygen-
enriched air:

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fuel consumption and lowers pro-
duction costs for manufacture of
cement, ceramics and glass;
- * Improves reactor performance
and product yields of catalytic ox-
idations;
- * Increases flame intensity and thus
enhances combustion in industrial
heating;
- * Improves conversion of sulfides to
oxides in mining;
- * Permits handling of heavier
crudes in oil refining;
- * Boosts production in fermenters;
- * Is valuable as life support in aqua-
culture, high altitude stations such
as observatories and hospitals;
- * Can be used to convert sulfide to
thiosulphate in paper manufacture
effluent;
- * And aids incineration of solid
waste and aerobic digestion of
biodegradable matter in waste
water.

(*Chemtech*, 9/1987, p. 78).

WORLD'S LARGEST UNIT FOR PRODUCTION OF p-CHLORMETA XYLENOL COMES UP IN UK

Thomas Swan & Co. (UK) have
recently inaugurated, what is
reported to be the world's largest
dedicated plant for the production of
para chlormeta xyleneol (PCMX)
--also known as Chloroxylenol. The
plant is based on a new process,
which gives the major benefit of the

product of the highest purity -- 99%
w/w pure.

The most important application of
PCMX is as a broad-spectrum bac-
tericide in premium type antiseptic-
disinfectants for both consumer and
professional use. It is also employed
as a bactericide, fungicide or preser-
vative in a wide range of topical
pharmaceuticals and cosmetics as
well as in several industrial proces-
sing operations.

The company reports with confi-
dence that the product retains its
bactericidal properties over a wide
pH range (at least 4-9) and is not
susceptible to deactivations by dirt or
soil and is non-corrosive. For phar-
maceutical and cosmetic formula-
tors, there are said to be
considerable advantages in PCMX's
lower toxicity to humans (oral inges-
tion and skin or eye contact).

Recently, the Company has also
announced the future availability of
the related DCMX (Dichlor metaxyl-
enol). (*Mfg. Chemist*, 3/1987, p. 8).

HUNGARIAN PLANT FOR CYCLODEXTRIN INAUGURATED

A plant for the production of beta-
cyclodextrin has recently gone into
production in Hungary. The plant will
produce beta cyclodextrin from
starch based on their indigenous
technology on enzymatic reaction
developed by Gyoer Alcohol Enter-
prise of Budapest, Hungary. The
project will produce 130-150 tonnes
per annum of beta cyclodextrin, in
cooperation with Chinoin Pharma-
ceutical Enterprise of Hungary. Chi-
noin has registered 50 patents on
the use of cyclodextrins. Chinoin
researchers describe cyclodextrin as
empty capsules of molecular size,
into which molecules of drugs, aro-
matic plants, plant protection chem-
icals etc. can be locked into.
Therefore, cyclodextrin can be

advantageously employed in the pharmaceutical, food and cosmetic industries for producing new slow-release products. (*Mfg. Chemist*, 3/1987, p. 9).

REINFORCED-POLYESTER PIPE MATCHES PRESSURE CAPABILITY OF STEEL

Reinforced-polyester pipe that matches the pressure capability of steel pipes has been developed by General Composites Ltd. (Orange, Calif.) and is being manufactured by General Composites (Canada) Ltd.

The key to the high pressure capability is a recently patented mechanical coupling for joining sections of the filament-wound pipe. The filament-wound pipe can take very high pressures, but the irony has been that when it came to the joint -- you had to fall back on using epoxy (to glue the pieces together). This limits conventionally-coupled

pipe to pressures under 1000 psi, compared with 3000 psi for steel pipe.

The mechanical coupling consists of three reinforced-polyester pieces. Two are half couplings that fit around a pipe joint from opposite sides and lock together to resist longitudinal force. The third piece is a filament-wound sleeve that fits over the assembly to hold everything together and provide hoop strength. A rubber gasket seals the space between the two pieces. This configuration can maintain a seal at 12000 psi with any conventional pipe diameter. The installed cost of the system is 30% less than that of steel ones. (*Chem. Eng.*, 11/9/87, p. 11).

LITHIUM BATTERIES MATURES IN U.S.A.

Lithium batteries are getting well established in the US battery market according to the recent study in bat-

tery market by Business Communications Co., a Norwalk, Conn. based research firm.

The commercialisation of marketed lithium batteries began in 1986 in USA. By 1996, it is expected that sales of primary lithium batteries will reach \$432 million, at an average annual rate. If a commercial lithium copolymer battery appears by then, it will dramatically alter the battery industry.

The total battery market was \$5.5 billion in 1986 and is expected to climb to \$6.75 billion by 1996. Besides lithium, lucrative markets include advanced lead-acid, nickel-chloride, redox (flow) nickel, sodium-sulfur, lead and many others. Currently, batteries are used in portable communication devices, transceivers, pagers, cordless phones and cellular radios. (6/29/87, p. 9).

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Opportunities in Chemicals, their Ancillaries and Allied Industries*

H. KRISHNAMOORTHY
Chairman & Managing Director,
Hindustan Organic Chemicals Ltd.

INTRODUCTION

Role of Chemical Industry in the social and economic development of our country need not be over-sized. Since the declaration of independence, this industry has emerged to establish for itself a unique position in our economy and today it has the distinction of occupying the fourth position in our country.

The development of organic chemical industry in India can be considered to have taken place in three stages. In the first stage, i.e. prior to independence, the organic chemicals production was confined to primary chemicals such as Benzene, Toluene from coal tar and acetone from Calcium Carbide. The second stage of development consisted in the development of many organic chemicals based on renewable resources viz. alcohol.

In the third phase, petrochemical based bulk organic chemical and intermediate industry emerged and witnessed a remarkable growth overshadowing the alcohol and coal tar based organic chemicals development. The chemical industry has had to face many challenges such as fluctuation in oil price, periodical shift in supply demand pattern and raw material availability. However, during the last two decades, the base of this industry has gradually been widened with the increasing availability of feedstocks. This situation could be made possible largely due to the pragmatic approach of the Government of India in identifying the critical raw materials required by the consumer industry indigenously and the establishment of large production units in both private and public sectors. The establishment of these units has resulted not only in substantial import substitution but has enabled the country to export chemicals and various products based on these chemicals to other countries.

FUTURE SCOPE FOR CHEMICALS/ALLIED INDUSTRIES

As has been noted above, the chemical industry came into being in this country only during the last twentyfive years

especially after the setting up of naphtha cracker in the sixties by Union Carbide and National Organic Chemical Industries in the private sector and the establishment of HOC and IPCL in the public sector for production of organic chemicals and petrochemicals. Discovery of new off-shore oil fields in the Bombay region has opened up an entirely new vista for the development and growth of the organic chemicals and petrochemicals.

The present availability of gas, both associated and natural, is capable of supporting not only ten fertilizer plants with a size of 1350 tonnes per day of ammonia and 2250 tonnes per day of urea but also large petrochemical complexes. The production of aromatics is also steadily growing. Bharat Petroleum Corporation has commissioned its huge benzene plant. Aromatic recovery projects at Cochin Refinery, in Saleempur in UP and Haldia in West Bengal are all in different stages of construction.

The work of Maharashtra Gas Crackers Complex has also been started. With these heartening developments in various directions, it is easy to perceive that there is considerable scope for chemicals in the coming decade. It is not my intention to cover the entire gamut of chemicals and petrochemicals in this short presentation but I shall restrict myself in the course of this talk to a few selected areas of the chemical industry which has very vast potential for growth.

INDUSTRIAL OPPORTUNITIES IN CHEMICALS: SOME SUGGESTIONS

I shall restrict my presentation to the following few selected areas:

- Dyestuff and Dye-intermediates.
- Drugs and pharmaceuticals.
- Pesticides and agrochemicals.
- Phenol based chemicals.
- Engineering plastics like Nylon, Polycarbonates, Polyacetals, Poly-tetra-fluoro-ethylene, Polyurethanes.

Dyestuff and Dye Intermediates

During the last three decades, the dyestuff industry has achieved remarkable progress. India today produces a host of dyes and intermediates. Apart from meeting the demand of consuming industries, such as Textile, Pesticides, Leather, Plastics and others, the industry caters to the need of international markets like USA, UK, Japan, Italy, USSR, FRG, France also.

More than 95% of all dyes consumed in the country are now produced indigenously by organised sector and small scale units.

Manufacture of dyestuff is dependent on the supply of various organic chemical intermediates. The manufacture of the group of dye intermediates; Nitro Benzene, Aniline, Nitrotoluene, Nitrochlorobenzene and Dinitrobenzene started with the establishment of the HOC complex at Rasayani and since then been growing fast. Thus the Indian Dyestuff Industry enjoys a good measure of self-sufficiency in intermediates which is so essential for rapid development.

The market potential for dyestuff in India has been given in Annexure-I from which it will be seen that market for dyestuff industry is still considerable and therefore it is worthwhile expanding existing manufacturing facilities and the establishment of suitable new ventures.

Drugs and Pharmaceuticals

Drugs and pharmaceuticals industry has achieved phenomenal growth since independence. The Industry manufactures practically the entire range of drug formulations. This has been possible due to availability of indigenous raw materials, like Acetanilide, Aniline, Nitrobenzene, Nitrochlorobenzenes, Meta-Amino-Phenol, Meta-Nitro-Chlorobenzene, Chlorobenzenes.

The range of products that can be manufactured based on the above intermediates alongwith market potential has been given in Annexure-II.

Pesticides and Agrochemicals

Fertilizers and pesticides are two of the important inputs provided by the chemical industry to achieve increased food production. The last thirty years have seen the country make rapid strides in trying to keep pace with its food requirements. The improvements in agriculture with inputs like high yielding varieties, fertilizers, irrigation and proper plant protection with improved pesticides has been the corner-stone of our

economic progress. Considering the large area of cultivation of rice, cotton, sugarcane, etc., the justification for establishing further units for pesticides and agrochemicals as indicated in Annexure-III.

Phenol based Industries

Phenol Formaldehyde Resins

It is the single largest user of phenol. The phenol formaldehyde is a thermoset resin. The range of products set includes phenol formaldehyde (PF), urea formaldehyde (UF), melamine formaldehyde (MF) and other based resins in various forms including moulding powders and laminates.

PF resin finds application in industrial and domestic laminates, moulding powders for electrical applications, plywood and particle board, abrasives, foundry sand, textile auxiliaries, varnishes etc.

Present production of PF resins is about 52.00 MTs. The total demand of PF resins by 1989-90 is estimated at 1,00,000 MTs. Thus there exists a very good potential for setting up of this industry.

Bisphenol-A

It is produced by condensation of phenol and acetone in presence of catalyst.

The major applications of Bisphenol-A are: epoxies, resins, polycarbonate resins, polyester resins, flame retardants, rubber chemicals, fungicides.

The existing demand of Bisphenol-A mainly for epoxies is 1,750 MTs. The demand by 1989-90 for epoxies is estimated at 3,650 MTs. The total demand considering the growth of polycarbonate resins by 1989-90 is estimated at 5,650 MTs. The present production of Bisphenol-A is limited to 1,500 MTs. Thus there exists a good potential demand for setting up of Bisphenol-A units.

Alkyl Phenol -- Nonyl Phenols & Dodecyl Phenols

It is another promising area and enjoying a growth rate of 15% per annum. Present demand is estimated at 2,500 TPA of Nonyl phenol and 2,500 TPA of Dodecyl phenol.

A Bombay based company has already set up a unit at Ankleshwar for the manufacture of Nonyl Phenol and Dodecyl Phenol. Nonyl Phenol capacity is 1,500 TPA. They are expanding Dodecyl Phenol Capacity of

sting) to 2,000 MTA. A producer of phenol is setting up a unit for the manufacture of 1,500 MTA of phenol.

Phenol and Dodecyl Phenol used as surfactants are manufactured by the alkylation of phenol by Dodecene and Dodecene respectively. An integrated plant has been set up for manufacture of both the phenols.

Present demand for Nonyl Phenol and Dodecyl Phenol together is 5,000 MTs and the estimated demand for 1989-90 is 10,000 MTs.

Paracetamol

Paracetamol is a well known analgesic and antipyretic. Present production is around 2,500 MTs. The estimated demand by 1989-90 is around 6,600 MTs taking into account the export market also. Paracetamol can be manufactured either from Phenol or Parachlorobenzene as starting raw material.

Chlorophenols

A number of chlorophenols can be manufactured based on Phenol; Penta Chlorophenol (PCP), O-chlorophenol (OCP), 2,4 Dichloro Phenol (2,4D) and 2,4,5, Trichlorophenol (2,4,5,T) are some of the products in this range.

OCP and OCP are used in the manufacture of certain intermediates like purple dye. 2,4,D and 2,4,5,T are used in pesticides and leather preservative industries. Pentachlorophenol is extensively used as a fungicide in leather and food preservative industries. The present production is around 300 MTs. The estimated demand by 1989-90 is 1,200 MTs.

Engineering Plastics

The bewildering number and variety of plastics are conveniently grouped based upon the end use and tonnage as commodity plastics, engineering plastics and specialty plastics. Again there is no rigid rule about this classification. High density polyethylene, low density polyethylene, PVC etc. are commonly referred to as commodity plastics in view of their large production and consumption. Engineering plastics are a group of polymers offering high strength, stiffness, toughness and resistance to wear, chemical attack and heat. They are so labelled because their structural properties allow them to replace metals in engineering applications on account of their lighter weight and cost benefits as well as providing performance advantages such as corrosion and wear resistance. Nylon, Polycarbonate, Po-

lyacetals, Poly Tetra Fluoro Ethylene and Polyurethanes are some of the examples of engineering plastics which will be discussed in detail.

Nylon

Nylon, despite having been around for many years still has much to offer the engineering plastics market place. Inherently the material has a range of attractive properties such as:

- * Low weight
- * High Strength to weight ratio
- * Good impact strength
- * Good inherent flammability performance
- * Good chemical resistance
- * Easy to process
- * Excellent heat resistance.

Because of the above properties Nylon finds applications in a number of industries such as electrical, light engineering, automotive and household appliances and other consumer goods. Some illustrations of the articles made out of Nylon would be coil forms and other parts of industrial switches and relays, components of small motors and measuring instruments, conveyor belts, rollers, wind shield wiper motor parts, carburetor components, parts for carving knives, can openers and parts for water pumps and pump impellers for washing machines and dish washers. The resistance of Nylon together with its smooth surface makes it suitable in a wide variety of kitchen utensils. The present consumption in our country is around 4,000 TPA which is met by indigenous production to the tune of 3,600 TPA and the remaining 400 tonnes by imports. The projected demand by the year 2000 AD is 17,500 tonnes. At present there are about five producers of Nylon-6. Production of other types of Nylon such as Nylon 66 has been also started by a couple of parties in the last few years.

Polycarbonates

Polycarbonate is a thermoplastic with the unusual combination of good mechanical properties over a very wide range of temperatures, electrical insulating properties, flame retardance, crystal clear transparencies and non-toxicity. However, PC is of limited suitability in applications demanding a high level of stress crack resistance in contact with certain chemicals. When used as a substitute for glass, the material's poor scratch resistance can to some extent be overcome by coating.

PC is again a plastic which is yet to be produced in our country though, three or four parties have been

issued Letters of Intent by Government of India. In the advanced countries half of the total PC produced is used in the electrical and electronic industries where coil forms, terminals, battery parts, and films etc. are made of PC. The transparency of PC is exploited in such applications as aircraft light housing, aircraft dials, coffee mixer side glass, wind screens for cars and contact lens. In our country PC is used for making feeding bottles for infants. The toughness of PC is exploited in a number of mechanical applications like hose coupling, ball bearings, pipings and pump impellers.

At present as noted earlier there is no production of PC in the country and the present level of consumption of 6,000 TPA is entirely met by imports. The estimated demand of PC by 2000 AD will be around 10,000 TPA.

Polyacetals

The plastics class of polyacetals comprises homopolymers and copolymers of formaldehyde. Although there are some mechanical differences in the molecular structures, which also result in a few differences that should be taken into account when these materials are processed, both of these types of polymers are comparable when it comes to characteristic properties relevant in their application range. Some of the important characteristics of Polyacetals are:

- * Stiffness
- * Fatigue endurance
- * Resistance to creep
- * Low co-efficient of friction
- * Good appearance.

Although in many respects polyacetal resins are similar to Nylon, they are superior to them in their fatigue endurance, creep resistance and stiffness and water resistance. But the Nylons are superior in impact toughness and abrasion resistance.

Polyacetals are used in automobile industry for gears for speedometers, wind screen wipers, choke controls, instrument housing etc. In the plumbing industry, Polyacetal is replacing brass and zinc, in such components as pipe fittings, valve seats, shower heads. The other industrial applications of Polyacetals include pump and motor housings, seat belt buckles, conveyor belting slots, textile machinery parts etc.

Polyacetals are yet to be produced in our country. The present demand of 600 TPA is met entirely by imports. The projected demand by 2000 AD is 4,500 TPA.

Poly-Tetra-Fluoro-Ethylene (PTFE)

Amongst all fluoropolymers, PTFE occupies most place. In fact, PTFE is made in larger quantities than all the other fluoroplastics put together. PTFE is a very versatile engineering plastic having an excellent combination of many useful properties.

- * Total resistance to virtually all chemicals including acids.
- * High thermal stability -- it retains its useful properties in temperature range of -200°C to 250°C.
- * Non-adhesive and antistick properties.
- * Lowest co-efficient of friction for any known material and is therefore self-lubricating.
- * Low dielectric constant and dissipation factor hence its excellent electrical insulation properties.
- * Low Weatherability and thus is non-aging.

Considering further that PTFE is non-toxic, chemically non-flammable, it is treated as "Polymer of the Century". No other natural or man made material gives such a wide span of useful chemical and physical properties.

PTFE finds extensive use in the chemical, electrical, electronics and construction industries. PTFE gaskets, mechanical seals, O-rings are used with corrosive substances like concentrated Nitric Acid can be handled. Reactor vessels, distillation columns are often lined with PTFE to prevent corrosion.

PTFE thread sealant tapes are very common in the chemical industry for plugging leakages. Because of its electrical properties, PTFE is highly preferred for cables and wires on aircrafts, space vehicles, missiles and computers. Because of the low co-efficient of friction PTFE lined load bearing pads are widely used in supporting structures, bridges and pipelines. No other property is exploited for coating purposes for machinery wear and in certain industrial applications.

PTFE has got a big role to play in strategic armaments. A large number of PTFE components are used in the production of armaments and other items of defence. PTFE also finds use in space research and nuclear industry. Thus, PTFE is very important from the strategic point of view.

PTFE has also a great role to play in thrusting India to a position of national importance. Some of these would be:

- * PTFE bearings and pads for railway bogies
- * PTFE insulation for cross country high voltage transmission;

bearing pads for long distance gas pipelines as H-B-J.

coating for agricultural implements.

Recently, PTFE was imported in the country. The import during 1984-85 was of the order of 300 tonnes. Recently, Hindustan Fluorocarbons Ltd., a subsidiary of Hindustan Organic Chemicals Ltd., a Government of India Enterprise, has commenced production at its plant in Rudraram near Hyderabad. The capacity of this plant is 500 TPA. The projected demand by 2000 AD is 1,500 TPA even without taking into account the needs of defence and large volume applications of national importance mentioned above.

Polyurethanes

Polyurethanes are plastics produced by reaction of isocyanates with polyols. The most commonly used isocyanates are Toluene di-isocyanate (TDI) and Diphenylmethane Diisocyanate (MDI). The Polyols used may be glycol alcohols or polyester alcohols. By selecting proper grades of isocyanates and polyols blended with additives, a wide spectrum of products could be obtained ranging from soft foams to very hard elastomers. Some of the important properties of polyurethanes are:

- Excellent thermal insulation and superior heat resistance;
- High Tensile Strength;
- High Abrasion resistance;
- Electrical properties similar to phenolic resins;
- Very good adhesion to metals, woods, glass, ceramics and fabrics;
- Capacity to form intricate moulds with perfect shapes and finish;
- Foams are firm, resilient, light weight and soft.

Polyurethanes have numerous and diverse applications. They are used as rigid and flexible foams, elastomers, fibres and surface coatings. Some of the uses are illustrated below:

Rigid Urethane Foams

Refrigeration

Insulation for refrigerators, deep freezers, air conditioners.

Insulation of refrigerated trucks, vans, tankers, wagons carrying perishables.

Construction

Wall construction of special types, prefabricated and insulated.

Spray applied wall construction.

- * **Aircraft**
 - Aircraft wing tips
 - Radar Covers
 - Fuselage insulation
- * **Transport**
 - Bumpers, crash pads for automobiles
 - Roof insulation for cars, buses, railway coaches
- * **Navy**
 - Void fillers for atomic submarines
 - Life boats
 - Methane carriers
- * **Furniture**
- * **Packaging**

Flexible Urethane Foams

- * Bedding
- * Packaging
- * Clothing & Fabrics

Elastomers

- * Rollers for printing press, for textiles and for rice de-husking
- * Footwears
- * Tyres for fork-lift trucks

Binding Applications

Binding and impregnating for inert materials such as cork, paper, leather, textiles etc.

Coatings

- * **Surface Coating**
 - Technical/special paints e.g. marine and exterior wood finish varnishes and wood sealants.
- * **Enamels**
 - Wire Coating Enamel.

While the basic raw materials for polyurethanes viz. TDI or MDI and Polyols are still to be produced in our country, we are at present producing various products made of polyurethanes to the extent of 4,500 tonnes per annum. Another 500 tonnes per annum of polyurethane products are imported. The total demand for polyurethanes by 2000 AD is estimated as 40,000 tonnes per annum.

CONCLUSION

Thus, it will be seen that there is considerable scope in our state of Maharashtra for establishment of manufacturing facilities not only in the classical areas of dyestuffs, drugs and agrochemicals but also in the emerging area of engineering plastics. In a sense, the

demand projections given by us are conservative. It should not be forgotten that the real market potential is many times higher than these projections for the reason that we have to serve the needs of a population of 790 millions at present, which may even cross the thousand million mark by the turn of the century. While every effort is certainly to be made for containing the population, it should also be noted that for every mouth that has to be fed there are two hands to work. If all of us including planners and economists of this country make a determined bid to generate adequate employment in the rural areas, the economy of the country will grow exponentially. This is not an utopia. This is well within the realm of practical achievement.

Therefore it is our bounden duty to be prepared for such an explosive growth in the economy and the consequent contribution which would be expected from the

chemical industry. Ability to serve the market is very much a function of our production capability in turn is dependent upon the level and sophistication of the technology used. We should build up our strength especially in polymer chemistry, the science of alloys and composites and end-use innovations in our National Laboratories, R & D centres in the industry and our universities should give a thrust to the development of the technology, a partnership between manufacturers, processors and the end users is essential to capitalise on the technology development.

There is no doubt that with the increasing awareness of the role chemical industry generated by schemes such as this organised by the Maharashtra Economic Development Council we shall be entering the 21st century as one of the leading nations in the world in the field of manufacture and use of chemicals.

ANNEXURE-I LIST OF DYES AND DYESTUFF INTERMEDIATES

Item	Main Raw Materials	Estimated demand during 89-90 (MT)	Gr. Ra
Naphthols			
Naphthol AS	Aniline	900	
Naphthol AS BS	Meta Dinitrobenzene	375	1
Naphthol AS OL	Ortho Nitrochloro Benzene	100	
Naphthol AS-PH	Ortho Nitrochloro Benzene	50	1
Naphthol AS-D	Ortho Nitrotoluene	275	1
Naphthol AS-TR	Ortho Nitrotoluene	160	
Fast Colour Bases			
Fast Scarlet R Base	Ortho Nitrochloro Benzene	375	1
Fast Red B Base	Ortho Nitrochloro Benzene	300	1
Fast Bordeaux GP Base	Para Nitrochloro Benzene	175	1
Fast Red GL Base	Para Nitrotoluene	300	1
Fast Garnet GBC Base	Ortho Nitrotoluene	180	
Fast Scarlet G Base	Ortho Nitrotoluene	250	1
Azo Dyes			
Direct Black E	Nitrobenzene	1900	
Congo Red	Nitrobenzene	1000	
Acid Yellow 36	Nitrobenzene	650	
Basic Dyes			
Auramine (Basic Yellow 2)	Aniline	320	1
Brilliant Green (Basic Green 1)	Aniline	130	
Basic Violet 1 (Methyl Violet)	Aniline	190	
Whitening Agents			
Fluorescent Whitener 1	Para Nitrotoluene	3500	1
Reactive Drugs (High value dyes)			
Reactive Red 189 (Helaktyn Red D-6B)	Para Nitrotoluene	30	
Reactive Yellow-1	Meta Nitrotoluene	25	
Reactive Red-2	Meta Nitrotoluene	20	

ANNEXURE-II LIST OF DRUGS AND PHARMACEUTICALS

Drugs	Main Raw Material	Estimated demand during 1989-90 (MT)	Projected Growth %
Amethoxazole	Acetanilide	525	10
Amphenazole		125	10
Amoxole		360	15
Amidimide		850	5
Amguamidine		400	5
Antibiotic Drugs			
Propionamide	Monochlorobenzene	67	15
Antimalarial drugs			
Chloroquin	Meta-Nitrochlorobenzene	67	15
Chloroquin	Meta-Nitrochlorobenzene	80	15
Aspirin			
Acetamol	Para-nitrochlorobenzene	6600	10
	Phenol and Aniline		
Antipsychotic			
Antipsychotic	Monochlorobenzene	160	15
	Para-nitro-chlorobenzene		

ANNEXURE-III LIST OF PESTICIDES AND AGROCHEMICALS

Uses	Main Raw material	Estimated annual demand by 89-90 (MT)	Growth Rate %
For control of weeds such as kochia, lamb-squarters, mustard, green foxtail etc. In sugar beets and red table beets.	Meta-aminophenol Meta-Nitro toluene	For Exports About 500	only 10
Used for control of many insects of economic importance being especially effective for boll weevil control, effective against green leaf hopper, stem borer, army worm, cut worms, vice case worms, leaf folders and vice bugs in rice and cotton.	Para-nitrochlorobenzene	3500	10
For controlling biting and sucking pests on vegetables and rice, especially effective against diamondback moth.	Ortho-nitrochlorobenzene	1000	15
Kills spider mites in the larval stages of development. Produces sterility in female mites contacting or feeding on deposit. Used on many species of fruits (including citrus and nuts) vegetables, cotton, hops, tea and ornamentals.	Monochlorobenzene	520	10
Registered for use on almonds, apricots, apples, artichokes, cherries, citrus, English walnuts, grapes, nectarines, peaches, pears, pecans, plums and prunes for control of apple maggot, cherry fruit fly, endling moth, hickory shuckworm, leafhoppers, aphids and mites.	Ortho-nitrochlorobenzene	500	10
For preemergence control of most annual grasses and certain broad leaf weeds in both seeded and transplanted crops.	Aniline	1100	10



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Chemical News from Abroad

MONTEDISON SET FOR MERGER AS FERRUZZI TIGHTENS GRIP

Gardini's official installation as chairman of Montedison on December 4 is widely expected to signal major changes in the direction of the company and herald the restart of negotiations on joint venture or mergers with Enichem.

Industry observers believe Gardini, also chairman of Montedison's largest shareholder Ferruzzi, will sell one or more major divisions in order to reduce the company's massive L8-9 trillion (US\$5-7.3bn) debt. Candidates for divestiture could include pharmaceuticals, fibres and even the newly-acquired polypropylene unit, Himont.

It is also thought that the departure of Montedison's former chairman Mario Schimberni could pave the way for a new round of negotiations with Enichem, at some form of co-operation with Enichem.

Gardini recently rejected Schimberni's plan in which Montedison management would run a merged company. Franco Reviglio, Enichem's chairman, said his group had no intention of relinquishing control of the strategic area of chemicals. Earlier, Montedison's offer to buy Enichem was rejected.

Recently, Lurgi Granelli, the minister with responsibility for state-owned companies, said the position was now reserved and that Eni could now seek to acquire Montedison. He is to call a meeting of the industrial policy committee in order to lay down guidelines for the creation of a single, major national chemical company. This move is support-

ed by the industry minister, Adolfo Battaglia, who intends to try and resume discussions aimed at finding a new basis for an alliance between Montedison and Enichem. A merger would create a company with annual sales of some \$11bn.

Eni's chairman, meanwhile, is even more cautious. During a recent parliamentary hearing, Reviglio resurrected his plan of creating four joint ventures with Montedison in basic chemicals, synthetic rubbers, fibres and agrochemicals. He believes that any future deal with Montedison should be on equal footing.

Meanwhile, Reviglio says Eni will continue to seek deals with other private groups and is requesting that some units be given a public quotation.

Enichem's boss, Lorenzo Necchi, is more outspoken. Recently he said that the main issue remains the development of the Italian chemical sector and not the question of whether Montedison or Enichem should take the lead. Necchi favours the creation of a single, major Italian chemical group which is capable of competing with other industry giants on a world scale.

The subject of the future shape of Montedison is equally unclear. UK analyst Stuart Wamsley of Morgan Stanley believes, along with many others, that assets will be sold in order to solve the debt problems. "Pharmaceuticals or Himont will go, but it will be a case of selling the good to keep the bad. There could be a real auction because everyone wants pharmaceuticals," he says.

Others, however, are more cautious and believe Gardini will not act hastily. They suggest

that both Ferruzzi and Montedison can service debt for at least six months, but concede the pharmaceuticals business could raise at least \$1.5bn.

Sources indicate that Montedison has received at least six enquiries concerning the pharmaceuticals business, including some outright bids. Companies from the US, UK and France are among those interested.

Gardini's decision to replace Mario Schimberni as Montedison chairman will tighten links between the chemicals group and Ferruzzi, which controls a 42 per cent stake. Relations between Gardini and Schimberni have been strained for some time and the former chairman apparently rejected an offer to remain as vice-chairman.

It is also likely, according to sources close to Montedison, that other senior managers such as Giorgio Porta and Lino Gardarelli, both close Schimberni associates, may face an uncertain future within the group.

HERCULES BUYS SPECIALITY UNIT

Hercules Inc. of the US has agreed to acquire Zimmerman Hobbs, the UK-based flavours and fragrances manufacturer, for £4.7m (\$8.5m). Once the deal is complete, Hercules plans to integrate Zimmerman into its worldwide food flavours and fragrances business, PFW.

Milton Keynes-based Zimmerman which also trades in essential oils and food and pharmaceutical chemicals, had sales of £11.6m (\$20.9m) in 1986.

PFW, with units in the UK, France, Denmark, US, Canada, Brazil, Australia and Singapore, is among the top five food flavours and fragrances producers in the world. Its sales are around \$250

m annually. The world market for these chemicals is around \$5.5bn. Overall growth is 4 per cent/year, but some sectors of food chemicals are expanding by up to 24 per cent/year.

BOC IN BID FOR CONTROL AT CIG

The BOC group has launched an £86m (\$155m) bid to acquire the Australian company Commonwealth Industrial Gases. Nearly 60 per cent of the shares are already owned by BOC and the bid is for the remaining 40 per cent.

Commonwealth had sales last year of Aus\$585m (\$405m) to September 1987, up 20 per cent. Profit was Aus\$63.5m (\$44m). The company makes industrial gases, welding equipment and healthcare products.

The acquisition will strengthen Australia's role at the centre of BOC's Pacific operations. Although BOC has joint venture companies in other parts of Asia, there are no plans to make bids for full control.

CdF CHIMIE AND MTM SET FOR JOINT VENTURE DEAL

France's CdF Chimie and MTM of the UK are expected to announce the creation of a speciality organics joint venture in the near future. The new company is likely to forge a link between CdF Chimie's oils, tars and derivatives business and MTM's major production unit, Marchem.

Recently, MTM made a public announcement that it intended to create a joint venture with another European group which would produce specialities for the world market. Both MTM and CdF Chimie have refused to confirm that they intend to form a partnership.

Widnes-based Marchem had sales of around £20m (\$36m) in 1986, 58 per cent of MTM's total group turnover of some £33.9m.

It produces a wide range of customized organic chemicals which are used as pharmaceutical intermediates and in the production of solvents and antioxidants.

MTM acquired the Widnes site in 1983 and has invested heavily to cut costs, expand production and improve quality. Total capacity is estimated at 30,000 ton/year and Marchem carries out toll and custom manufacturing of a number of specialized products.

French sources say CdF Chimie's derivatives business, centred on production sites at Loison in the Pas-de-Calais region of northern France, will be involved in the link with MTM. One area of specific interest is thought to be chlorinated toluene derivatives.

It is understood that both MTM and CdF Chimie will hold equal shares in the new venture.

UPJOHN BUYS SEEDS BUSINESS

Upjohn subsidiary Asgrow has acquired Bruinsma Seeds of the Netherlands. Bruinsma specializes in breeding and producing seeds for glasshouse produce including peppers, tomatoes, lettuce and cucumbers. Details were not disclosed, but sources say the deal would probably have cost Asgrow around \$10m.

Upjohn vice-president and general manager Gerald A. Welch said, "For some time Asgrow has wanted to expand its European operations, particularly in the protected culture vegetable seed segment."

Europe is the second vegetable seed market in the world. Asgrow currently has subsidiaries in Italy, and Germany and has a joint venture in Spain. According to Welch, the Bruinsma acquisition complements these and operations around the world.

Located in Honselersdijk, Bruinsma was a privately held company employing 80 people.

DUMPING THREAT TO FERTILIZERS

Worldwide overcapacity dumping is threatening the future of the European fertilizer industry, according to Gerrie Van Ling, president of the Fertilizer Manufacturers Association.

Speaking at the recent fertilizer convention in London, Van Ling warned that some major European companies could cease production within a few years if these problems are not solved. He also said major capacity cutbacks and some plant closures may soon be necessary if the industry is to reach a breakeven point.

Van Ling, who is also managing director of DSM subsidiary UKF Fertilisers, said that developing countries should seek to increase internal fertilizer consumption rather than dump surplus product on the overloaded European market.

Unless this situation changes, he suggested, the European fertilizer market will soon be in chaos as some major producers could be forced to quit the business.

The UKF executive also warned the industry that it faces a continued challenge from environmentalists who blame fertilizer manufacturers for cultural overproduction in the EEC and problems such as nitrate leaching.

Chemical Markets Abroad

ICES DISAPPOINT AS FACIES AHEAD

pite of buoyant demand downstream businesses and ber of plant problems whi- e-continued to tighten sup- e European ethylene oxide market has remained fairly the latter part of 1987.

prices have been fluctuat- roughout the year, starting und DM920/ton in January elling in March to DM870/ despite a price push by pro- s on the back of rising ene costs. Prices eventual- ke the DM1,300/ton barrier y and producers were look- o set a price target of DM 0-1,400/ton for Q3. How- current contract business is taking place at around ,200-1,300/ton.

ducers are expecting prices o up in the first quarter of new year, however, on the of tightening supply and ing ethylene costs. EO sup- has continued to shorten in pe, particularly after the ex- ion at BP's Antwerp EO faci- in July which took 113,000 year out of the market. In e of earlier predictions, BP, v does not expect the unit to art before Q3 next year.

European supply has been fur- hit by production problems luding Dow's EO unit at Ter- zen in the Netherlands, ell's Moerdijk plant and Erdol- emie's unit in West Germany.

This situation is mirrored in e US where EO supply is run- ng "tighter than ever." An hylene shortage in the US and oduction problems have curb- EO supply dramatically and ices have firmed to 22 cen.s/ ound. Prolonged produc.on difficulties at Union Carbide have

force majeure. As a result of the US problems, export busi- ness has now all but dried up.

European producers say they are confident of achieving price increases for the first quarter of 1988 with a general consensus being around DM1,350-1,400/ton.

However, if the EO market has been somewhat lacklustre over the past few months, it is in marked contrast to activity in down- stream businesses, particularly monoethylene glycol (MEG). MEG is riding high at the mom- ent with demand forging ahead and prompt product "virtually unavailable."

Strong seasonal demand from the antifreeze business and a shortening in supply caused by the EO production difficulties have sent spot prices soaring to DM1,200/ton and producers are having to turn away business.

Spot levels for MEG have now moved well ahead of the fourth quarter contract deals set at around DM950/ton for fibre grade and DM1,100-1,50/ton for technical grade. Producers are pushing for contract prices above DM1,150/ton for Q1 next year. Demand is strong and where product has become avail- able, it is being snapped up rap- idly. Some UK business has been heard at £370/ton and there have been enquiries from the Far East offering \$500-550/ton.

But producers and traders alike are growing increasingly concerned about what will hap- pen to the EO market and down- stream businesses next year as seven major European producers are set for maintenance shut- downs which will severely affect supply and could throw that mar- ket into turmoil.

BP has a four-week closure planned at Lavera in March and

BASF has a four-week closure planned at Ludwigshafen in May and at Antwerp in October. Shell's Moerdijk unit is earmark- ed for a two-week closure next March followed by a longer six- week shutdown in September. Erdolchemie has a major six- week closure set for April and Dow's plant will be closed for two or three weeks in July. Both ICI and Hoechst have closures planned for later in the year.

Customers are hoping that demand over the period can be met by imports either from Sau- di Arabia or the US. But with supplies still likely to be restric- ted, a price hike taking EO levels to at least DM1,500/ton for Q2 is envisaged. The inability of customers to hold EO stocks combined with low MEG inven- tories could cause a major pro- duct shortage and a consequent price spiral. Prices of DM1,800/ ton are being talked about for Q3.

HERCULES UPS NC PRICES IN CANADA

Hercules, North America's sole producer of nitrocellulose has announced a major hike in Canada in a bid to remove the 30 per cent dispar- ity between Canadian prices and the world market.

The company has announced a 17 per cent increase in nitro- cellulose taking levels to Can\$ 2.87/kilo (\$2.15/kilo). Canada's nitrocellulose market has been under pressure for some years and without the duty protection enjoyed by the US market, conti- nuing European imports have sent prices plummeting.

However, the move should not be unwelcome among European producers who have been finding it hard to maintain low export prices to North America with the continuing strength of West Eu- ropean currencies.

SODIUM CYANIDE MARKET STILL TIGHT

The temporary tightness in the world sodium cyanide market, following the Taiwanese acrylonitrile plant explosion last April, will continue and is expected to grow more severe with most producers now currently operating near capacity. ICI, the world's second largest producer had production difficulties mid-year and is still catching up with order arrears from them.

Estimates put the increase in world demand for the period 1983-88 at 80 per cent. Growth rates in gold mining, the major end user sector, have taken producers by surprise over the last two years. Demand from this sector is set to increase by up to 15 per cent this year, and make further gains next year.

The major world producers have responded to increased demand by up-rating existing plant. However, large-scale investment may be deterred as demand growth is exclusively in gold extraction, a volatile and insecure market. Also two new Australian producers will come on stream in 1989-90 with 400-450,000 ton/year, boosting world capacity by 20-25 per cent.

As a result, it is likely that sodium cyanide will remain tight until at least 1989. The only let up will come if manufacturers can stretch their plants further. Prices which steadied at around \$1,450/ton cif mid year, are likely to increase to around \$1,600/ton although prices as high as \$1,900/ton cif have been paid.

US producers account for 25 to 30 per cent of output. If the dollar remains weak, further price increases may occur in Japan and Europe.

DOLLAR SLIDE MAY DAMPEN UK EXPORTS

Weakness of the dollar in Europe is expected to curtail export volumes to the US, and will cause a substantial loss of competitiveness among UK chemical producers. This is the prediction of the **Trade and Indemnity Quarterly Economic Review** published recently.

Although the dollar's slide has previously helped soften the impact of high oil prices on the European chemicals industry, the report notes that the position of US exporters has strengthened recently.

Imports of US chemicals into Europe have increased this year, and combined with the currency imbalance this is expected to hold back UK chemical output growth to around 2 per cent next year. A predicted level for this year is 5 per cent. The value of the dollar against sterling has risen since the summer from \$1.570 on August 12 to \$1.647 on October 14 and \$1.773 on November 25.

TOUGHER CFC CONTROLS URGED

Two European environmental groups are urging the EEC and the chemical industry to introduce tougher controls on the emission of chlorofluorocarbons (CFCs). The European bureau of consumer unions and the European environmental bureau want CFC emissions cut by 85 per cent within five years.

In September, United Nations members signed a protocol in Montreal which will freeze CFC production at 1986 levels in 1992 and then reduce output by 20 per cent by 1994 and a further 30 per cent by 1999. The environmental groups, while welcoming the Montreal protocol as a step in the right direction,

feel tougher measures are sary to prevent further CFpletion of the ozone layer.

Meanwhile, in the US, senators are asking the UN environmental programme to re-evaluate CFC controls in the light of scientific studies showing a decrease in the ozone layer over Antarctica.

In contrast to the fears of environmentalists, a recent report prepared for the US chemical manufacturers association (AIChE) by Dr. Mack McFarland suggests that limits agreed in Montreal would result in no change in the world's ozone levels.

PHOSPHATE START-UP

FMC Corporation's Chemical Products group has started additional capacity at its thermal phosphate plant in Greentown, Wyoming. The plant, which is claimed to be the largest in the world, has doubled capacity to more than 204,000 ton/year.

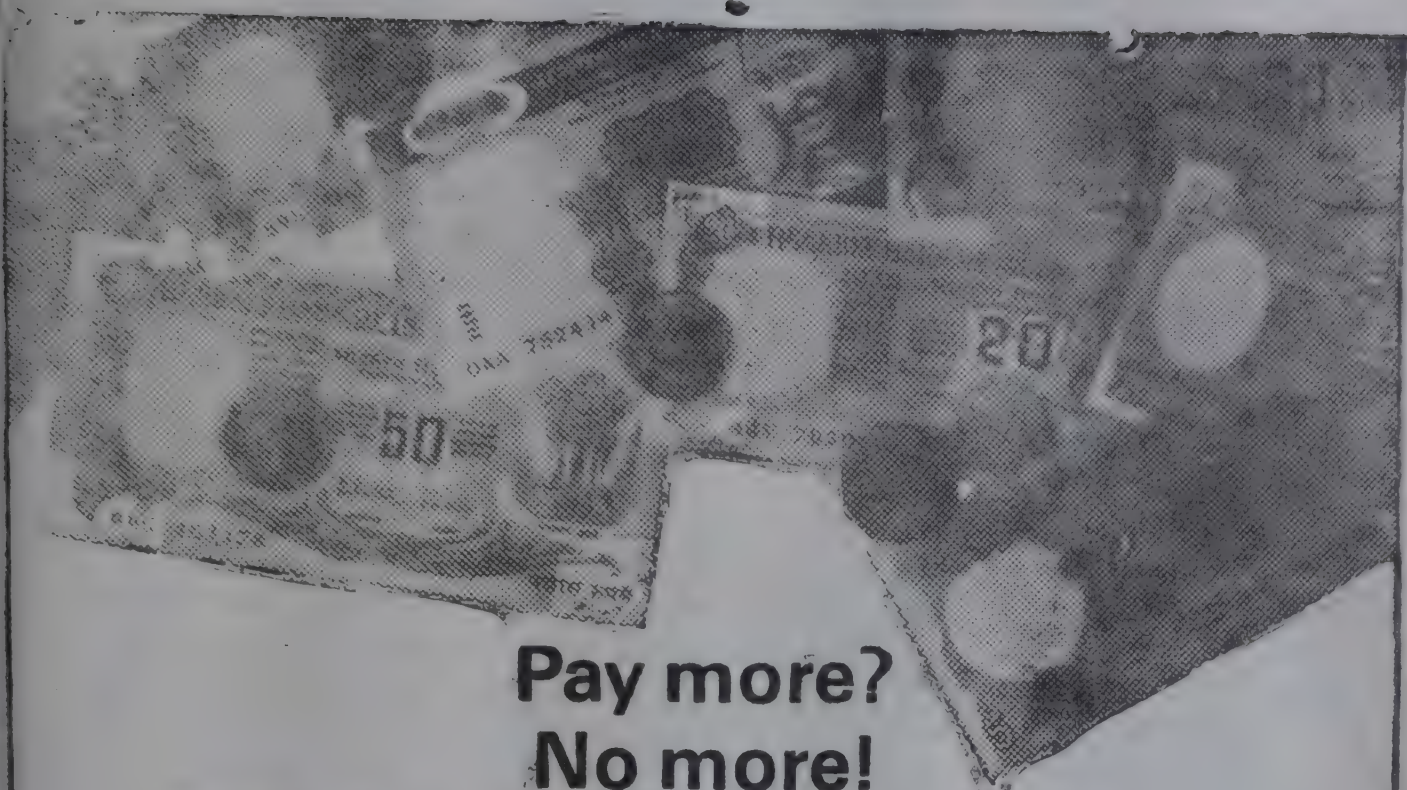
Despite a decline in the phosphorous market in recent years which is now half what it was in 1970, FMC has been able to increase sales and market volume since 1980.

HENKEL IN CHINA

Henkel, West Germany's fourth largest chemical group, is planning to open a representative office in Beijing early in 1988 as part of a move towards local production.

Negotiations are in progress for joint ventures with Chinese companies. Construction of speciality chemicals are of the highest interest to the Chinese, according to a company spokesman.

In Europe, Henkel's plan to buy the detergents operation of Mira Lanza have stalled over an asking price of L300bn (£1.5m).



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In the European Market

Naphtha prices have firmed in a generally dull market. Availability is best in the Med where material from the Middle East is being offered at \$149-152/ton cif NEW.

Ethylene prices have remained stable at \$475-485/ton cif NEW. Supply is improving as most of Europe's cracker problems are now reported to have been solved apart from ROW's G6 unit. One major supplier has settled fourth quarter contracts at DM830-850/ton delivered.

Propylene levels have remained steady at \$379-391/ton but demand is slack. Despite improved supply from the cracker start ups, most business has been limited to contract supplies. US prices are also steady at around 20 cents/pound but no shipments to Europe have been reported thanks to increased freight rates. With spot prices expected to fall, buyers are pushing for DM590/ton for Q1, contract 1988 negotiations but producers are looking for higher levels of at least DM 650/ton.

Benzene prices have now stabilized at around \$255-265/ton

after slipping \$10/ton last week.

Toluene levels have slipped back a further \$5-10/ton to \$ 215-220/ton in a quiet market. Demand from the gasoline pool has fallen right off and demand for chemical use is also sluggish. A revival in the market is not expected before the end of the year.

Butadiene prices lost around \$20/ton last week but now appear to be relatively stable in the range \$600-620/ton fob. The immediate trend is not clear but prices could fall in the first quarter next year when stocks have been replenished. Production is now back to normal following maintenance periods and the market has fallen into balance. Demand from the US and Far East, however, could tail off when stock building activity is complete. Demand is reported to be particularly strong from ABS and SBR producers.

Trading in **paraxylene** has remained very quiet and hopes that levels could edge up beyond \$315-318/ton may have to be revised. 5,000 ton of European

product has been sold but a price was not disclosed.

Lack of activity has characterized the **orthoxylenes**. Traders report the sold product is available in Rotterdam, but sources say unlikely to be any improvement of current levels of \$2/ton and some are even expecting prices to slip before the end of the year.

Little trading has been seen in the **styrene** market but have managed to edge up slightly to \$1,200-1,210/ton material, reflecting a shortage of spot material. Prices, however, have backed to around \$1,270-1,280/ton. Demand is reported to be slack off as consumers run down stocks for the year end.

After panic buying, **methanol** prices up, levels now stabilized at \$147-148/T2. A major shipment from the US has dried up spot supply in Rotterdam, and supplies for Europe have now been redirected to the more lucrative market. With demand still strong, T1 prices have firmed at \$130/ton cif NWE.

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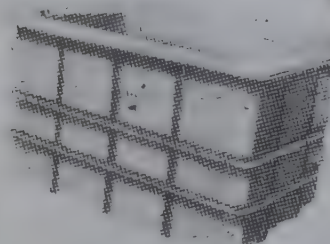
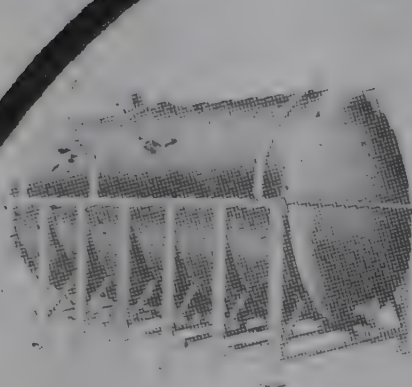
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Technological Scene Abroad

Determining the productive life of motor oils

A test procedure for determining the high-temperature antioxidant capability (HTAC) of motor oils — an important property, since oxidation causes motor oils to lose their lubricating ability — has been developed by Ford Motor. The test involves determining how long it takes for hexadecane — a common component of motor oil — to be oxidized by continually adding hydroperoxides to a stirred-flow-reactor at 160 deg. C. The conditions closely simulate the oxidizing conditions in a working engine, says Milton D. Johnson, a Ford staff engineer. He found that two HTAC mechanisms predominate in the base oils from which motor oils are made. Some base oils prevent oxidation predominately by trapping free radicals, while others decompose hydroperoxide before it forms free radicals. Johnson also found that some oxidation inhibitors found naturally in base oils were active initially, and others were activated only after their formation during the oxidation process. Performance of such anti-oxidant additives as zinc dialkyldithiophosphates depends heavily on the composition of the base oil, says Johnson. He concludes that HTAC testing provides a means of fingerprinting base oils.

A new way to identify metal ions

A fast, low-cost analytical method for determining the identity and concentration of metal ions has been developed at Iowa State University (Ames), reports *Analytical Chemistry* (October 1987,

Vol. 59, pp. 2226-31). James S. Fritz, a professor of chemistry there, uses N-methylfurohydroxamic acid to chelate all the metal ions in a sample and separates the mixture on a styrene-divinylbenzene high-performance liquid chromatography (HPLC) column. The individual metal ion complexes are detected and quantified by measuring their absorption at 304 nanometers with an infrared absorption spectrometer. Fritz chose styrene-divinylbenzene as an HPLC support material because he found that traditional silica columns chelated metal ions more strongly than most chelating agents. Fritz demonstrated the utility of the technique by determining the amount of zirconium in commercial antiperspirants.

Measuring microspheres: All methods are not equal

Not all methods of measuring the size distribution of fluidizable cracking catalyst microspheres provide the same results, according to the American Society of Testing Materials (ASTM) Task Group on Particle Size (Philadelphia). ASTM sent samples from a single lot of microspheres to 18 laboratories, each of which measured particle size by the traditional method of sieving, as well as the newer methods of electroconductive sensing and light scattering. Compared with sieving, electroconductive sensing typically showed a difference of 5-6 micrometers for microspheres in the range of 35-100 micrometers in diameter, a deviance that ASTM says is not significant. Light scattering, on the other hand, was only 2-3 micrometers different from sieving for microspheres from 35-60

micrometers in diameter. However, when microspheres larger than 60 micrometers in diameter, light scattering indicated a difference of as much as 10 micrometers. As a result, the task force urges that "appropriate caution should be used in interpreting or comparing data obtained by light scattering."

Progress in fermentation of biotin

Nippon Zeon (Tokyo) and French biotechnology company Transgene (Strasbourg), have been cooperating since September 1985 to develop an efficient fermentation route for min H, biotin, reported promising results in a paper presented to the 60th annual meeting of the Japanese Biochemical Society. Researchers from the two companies say that they have expressed the bio-b gene in *Escherichia coli*, a bacterium that produces high levels of biotin. They have achieved improved biotin synthesis rates. Biotin, a natural supplement for human and animal nutrition and in pharmaceutical preparations, commands an annual market of \$100 million, say the companies.

DNA probes for spotting predisposition to cancer

The use of DNA probes to assess an individual's inherited risk of developing certain types of cancer is the aim of \$1 million, five-year contract to the Genetics Institute (Framingham, Mass.) from the National Cancer Institute. The probes would analyze the DNA from blood samples for the presence of specific segments of DNA, known as "gene markers", that have been shown to be closely linked to defective genes that are believed to be related to cancer.

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Polypropylene makers team up to cut process costs

Three polypropylene producers — BASF (Ludwigshafen, West Germany), Imperial Chemical Industries (London), and National Distillers and Chemicals (New York City) — have formed a pact under which they will share proprietary engineering data and technical insights. The three companies have begun a series of meetings to exchange operations and research results on their respective gas phase processes. The objective of the pact, say the companies, is to improve polypropylene yields and slash energy use.

ICI expands in engineering plastics

Imperial Chemical Industries' (ICI) Advanced Materials has commissioned its first full-scale plant to make high-temperature engineering thermoplastics polyether ether ketone (PEEK) and polyether ketone (PEK). The \$14 million batch plant at the company's Hillhouse site, near Blackpool in northwestern England, will have a rated capacity of 1,000 metric tons/year of the two ketones, which will be sold under the Victrex label in Europe, the U.S. and the Far East. The process is essentially a condensation polymerization of dihalogen-ended and dihydroxy-ended monomers. Dichlorobenzophenone and hydroquinone — both monomers made at the company's Ardeer, Scotland, plant — are believed to be the starting materials. A metal salt is used to promote the linking of the hydroxy and halogen ends of the monomers, and the polymerization takes place at 250-300 deg. C in a solvent. The metal salt is then leached out and the solvent

recovered. ICI says key steps are the leaching to cut the metal salt from "thousands of parts per million to less than 50 ppm" and the recovery of the solvent, which is a "very expensive" high-temperature aromatic solvent (a solid at room temperature). PEEK was initially made on a production scale in 1978 in a 150-m.t./year polyester sulfone (PES) plant at Hillhouse. That plant has recently been expanded to 2,000 m.t./year of PES. A small (100-m.t./year) multi-purpose plant in Wilmington, Del., has been used by ICI since 1983 to produce PEEK in the U.S.

Pennwalt receives approval for a diuretic

Pennwalt has received approval from the Food and Drug Administration for its Microx metolazone, a diuretic for treatment of mild to moderate hypertension. Pennwalt says that the drug results in minimal potassium loss and has few side effects. The company expects sales of the product to reach \$1.2 million this year and \$24 million by 1994. It pegs the U.S. diuretic market at \$500 million.

From Cornell: A new route to superconductor films

Cornell University engineers say they have developed a process capable of producing thin films of high-temperature superconductors at lower processing temperatures and at lower cost than existing methods, such as one developed at IBM. The new technique, called high-pressure reactive evaporation, is a significant step toward making practical superconducting films for microelectronic applications, says Cornell. Essentially, it consists of using beams of high-energy

electrons to evaporate two components of the superconductor, yttrium and barium, in a 700 deg. C chamber filled with oxygen at high pressure. A third component, copper, is evaporated from an electrically heated wire. The resultant vapor deposit, as a thin film of yttrium barium copper oxide, on the substrate material. The lower processing temperatures of the new technique mean that superconducting films could be used on computer chips without danger of heat damage to underlying components. In addition, in the new procedure the film is created on a substrate of silicon dioxide, which costs one-tenth as much as strontium titanate, the material used by other researchers. One drawback: The new superconductor ceramic cannot be created on a substrate of silicon, with which it reacts chemically.

A natural compound fights potato blight

In the 1840s, the Irish famine — caused by the fungus *Phytophthora infestans* — ended the deaths from starvation and malnutrition of 1 million people in Ireland and forced another million more to emigrate. Today, the fungus still causes large-scale problems. But now, says Cutler, a plant physiologist at the U.S. Dept. of Agriculture (Richard B. Russell Center, Marietta, Ga.), has discovered the fungus *Penicillium chrysogenum* makes an antibiotic called cyclophenol that is 95% effective in stopping the growth of *infestans*. Cutler says that cyclophenol could be made commercially by fermentation or by more potent analogs. He points out that several chemical companies have expressed interest in the compound.

News from the American Market

Carbide declares force majeure for EO/EG

Carbide declared a "force majeure condition" as a result of an extraordinary equipment failure, which resulted in the complete shutdown of one of two ethylene oxide (EO) and ethylene glycol (EO/EG) production units on Nov. 16. Carbide estimates that production from the unit will be able to resume in mid-December, but the extent and duration of the effects of the shutdown on product availability are uncertain. Carbide has had a sales control program for EO and most EO derivatives for several months. In some cases, customers have received 100% of their average monthly purchases, although sales control levels vary, Carbide spokesman says. The force majeure declaration does not mean sales control programmes for EO and EO derivatives will be restricted further, but Carbide has the legal right to do so, if necessary. For now, Carbide notes, sales control programmes for EO and EO derivatives "will continue for the indefinite future."

Phosphoric acid joint venture

Texasgulf (Raleigh, N. C.) and Albright & Wilson Americas (Richmond, Va.) have signed a letter of intent to form a joint venture company to build a 75,000-ton/year purified phosphoric acid plant at Lee Creek, N. C. The proposed plant should come on stream in the first half of 1989, a high time Albright & Wilson

will market the output for use in metal treating, detergents & food, and feed additives. Texasgulf will construct and operate the plant, while Albright & Wilson will provide the process technology. Wet process phosphoric acid from Texasgulf's nearby fertilizer complex and phosphate rock mine will be the starting material.

Prices go up for polyester polyols

Freeman Chemical's Chardonol Div. (Houston) will increase prices of its Chardol polyester polyols by 3 cent/lb on Jan. 1, 1988. Some special product prices will rise by 4 cent/lb at the same time, the company notes. Price increases are needed to cover rising costs for raw materials, especially ethylene oxide (EO) and diethylene glycol (DEG), says Milton J. Altenberg, Chardonol's vice-president and general manager. EO and DEG prices are expected to jump by at least 5 cent/lb in the first quarter. Polyester polyols continue to penetrate markets that traditionally relied on ethers based on propylene oxide, Altenberg says. He projects that demand for polyester polyols in rigid urethane will reach 120 million lb next year, compared with 35 million lb in 1983.

Celanese Chemical will increase its selling prices for methanol by 3 cent/gal on Jan. 1. That follows a 3 cent/gal price hike, effective Dec. 1, and will bring the price of barge quantities of methanol to 47 cent/gal., f.o.b. Bayport, Tex. Methanol supplies

have become increasingly tight, and producer tabs have risen steadily throughout the year. Air Products and Chemicals did not follow other methanol producers in hiking tabs by 3 cent/gal in November but, instead, raised prices by 6 cent/gal on Dec. 1. Higher methanol prices are forcing formaldehyde producers to increase their tabs. Borden Chemical will increase its formaldehyde price by 2 cent/lb on a 100% basis on Jan. 1. Celanese raised its formaldehyde price by 1 cent/lb, effective Dec. 1, and by an additional 1 cent/lb, effective Jan. 1.

Another styrene plant in Europe

Montedipe, the petrochemicals division of Italy's Montedison, will build a 200,000-metric tons/year styrene monomer plant at Mantua, Italy, thereby boosting its total styrene capacity to 500,000 m.t./year. The plant will come onstream in the second half of 1989 and cost \$81 million, Montedison says. It should give Montedison a big push forward in the styrenics market, putting the company's capacity on a par with that of Royal Dutch/Shell in Europe. Dow Chemical Europe and BASF will continue to be the largest styrene producers in Europe. Montedipe's announcement follows closely one by Elf Aquitaine concerning its plans to expand styrene capacity at Gonfreville, France, by 100,000 m.t./year. European demand for polymers containing styrene has grown an average of 6.5%/year during the past two years, Montedison estimates, and output from Montedipe's new plant is expected to help meet marketplace requirements for polystyrenes.

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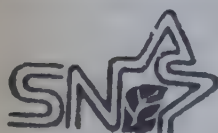
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Special Article

The Future Looks Bright for a New Chromatograph

For some time, chromatography has been important in separating mixtures into components. It has rapidly become the method of choice for separating the protein products of genetic engineering. In many cases, chromatography has replaced such classical separation methods as ultrafiltration and crystallization.

Now a relatively new type of liquid-liquid chromatography has been developed by Sanki Engineering (Kyoto, Japan). Known as centrifugal partition chromatography (CPC), the technique has started winning customers in the U.S.

Sanki boasts that CPC has advantages over such established forms of chromatography as liquid chromatography, gas chromatography and high-performance liquid chromatography (HPLC). Unlike those forms of chromatography, CPC does not irreversibly retain mixture components, because it has no solid support to bind components. The mild operating conditions of CPC prevent breakdowns of mixture components, breakdowns that are occasionally encountered with conventional packed chromatographic columns. And because CPC can be performed at just about any acidity level, pH constraints imposed by solid supports like silica are not a consideration. Says John Devlin, coordinator of the drug research programme at Boehringer Ingelheim Pharmaceuticals (Ridgefield, Conn.), "Once Sanki gets a few of the kinks out and it

gets a bit cheaper, CPC will have a big future."

U.S. units

Sanki introduced CPC in Japan in 1982 and has sold more than 200 units to customers, including Sumitomo Chemical, Fuji Photo and Kyoto University, but had little success in the US until last year when it opened a subsidiary, Sanki Laboratories (Sharon Hill, Pa.). So far, six units, priced from \$20,000-50,000, have been sold this year. Customers include Boehringer Ingelheim, Columbia University and Case Western Reserve University.

Sanki originally forecast U.S. sales of 50 units in 1988. It now expects to sell more, says Jack Cazes, vice-president and operations manager of Sanki Laboratories. Cazes expects the U.S. market to be "many times" larger than the Japanese market. And he predicts that CPC annual worldwide sales, including plant-scale systems, will eventually surpass a "few billion dollars."

Sanki customers are pleased with the chromatograph. "When you put a complex, unknown mixture on it, everything is recoverable and can be separated," says Boehringer's Devlin. Boehringer uses its CPC to separate natural products and products of complex chemical syntheses. And Koji Nakanishi, a chemistry professor at Columbia University (New York City), believes that CPC will find application "wher-

ever separation is needed. It uses CPC to separate samples as human bile, chlorpheniramine, a mixture of antibiotics,

Sanki also envisions application for CPC. It is the technique offers advantages in the separation of drugs, biologicals, agricultural chemicals, food additives and metals.

CPC provides a new technique for classical separation technology. In the method, separation columns are connected in series in cartridges, which are rotated in a circle around a central rotor. The stationary phase — which is often the denser of the two immiscible liquids — is maintained in the separation columns by centrifugal force. The mobile phase — usually the less dense liquid — is pumped through the separation columns, coming in intimate contact with the stationary phase. Separated components are detected as they elute from the chromatograph by an ultraviolet-visible (UV-VIS) absorbance detector.

Separation of polar samples is often accomplished by using an organic solvent like chloroform or butanol in combination with an aqueous phase. Separation of nonpolar samples is generally done with nonaqueous, two-phase solvent systems. And polymers are readily separated with aqueous, two-phase systems consisting of solutions of water-soluble polymers,

and polyethylene gly-

phase

er, the stationary and phases can be reversed, the stationary phase the phase and vice versa. For non-polar components eluted in the mobile phase polar components are in the stationary phase. Components can then be by switching which solvent motion. To do that, stationary-phase solvent is and the direction of flow sed. Columbia's Nakasaka calls this ability a "big advantage" for CPC.

also can be readily scaled for continuous separations, Banki's Cazes. Furthermore,

because the process is carried out in a closed system and because solvents can be recovered and recycled, environmental problems and costs can be kept to a minimum. That, Cazes says, contrasts with HPLC, which he calls "prohibitively expensive" commercially; it entails column-packing costs up to \$1 million and generates disposal problems.

Sophie L. Wilkinson, with Shota Ushio in Tokyo

Du Pont will market an H_2O_2 -based pulp process

International Paper (New York City) has developed and patented a second-generation pulp-bleaching technology that it says "offers significant manufacturing cost, product quality and environmental benefits." The

new process, called Eop, uses hydrogen peroxide to enhance the delignifying and bleaching effects of oxygen, which is added in an alkaline extraction stage of a multistage bleaching process. Furthermore, International Paper has named Du Pont, a major U.S. hydrogen peroxide producer, the exclusive licensing agent for the technology, which will be used in the U.S., Japan and Scandinavia. "The pulp and paper industry is the single largest market for hydrogen peroxide in North America," says Joseph R. Westwood, Du Pont's business manager of peroxygens. "In fact," he adds, "the use of hydrogen peroxide in pulp and paper is growing much faster than the industry itself, because of the need to produce higher-quality paper and paperboard at lower cost."

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News About New Projects

ARABIA IN MAJOR ETHYLENE CAPACITY PUSH

Major Ethylene expansion programme is under way in Arabia. But while parts of it are well defined, others are a mystery.

Saudi Arabia's wholly-owned subsidiary Petrokemya is installing new furnaces in the Al Jubail ethane cracker, which will, by 1988, lift capacity from 650,000 ton/year to 650,000 ton/year or more (each furnace can produce up to 100,000 ton/year).

According to several sources in the industry, Sabic is also looking at the possibility of building a brand new ethylene plant, this time based on naphtha, with a capacity between 600,000 ton/year. The project, sources claim, would be sited for the Petrokemya complex at Al Jubail.

Sabic, however, which likes to keep plans confidential, has declined this, saying that "the information is not officially accurate". Sabic is conducting a propylene feasibility study. Options do not include doubling any plant ethylene capacity or building a naphtha cracker. The overall study is expected to be completed next year".

Sources say that the political and economic situation, exacerbated by the collapse of the oil market, is likely to delay plans.

The Yanbu-based Saudi Yanbu Petrochemical, a joint venture with Mobil, is also installing a new furnace which will increase capacity to 560,000 ton/year. Lummus is supplying the new furnace.

The third ethylene plant in Saudi Arabia, owned by Sadaf

a Sabic-Shell joint venture, is poised to invest in a new furnace which will lead to an expansion from 656,000 ton/year to 760,000 ton/year.

When completed, the projects, excluding the new naphtha cracker, will raise the Kingdom's ethylene capacity to around 2m ton/year.

Anbil Mansouri, vice-president of Petrokemya, said that the expansion currently under way will help to meet the growing demand from downstream producers, such as Sharq and Ibn Hayyan, and from the export markets. At present Petrokemya exports about 20-25 per cent of its total ethylene capacity.

The Petrokemya cracker was originally built by Chiyoda Chemical Engineering using C.F. Braun technology and six Selas Hitachi furnaces. Bellei Saudi Arabia is expanding the complex under a \$12-15m contract. Lummus Crest is supplying the furnaces.

A shut down period of 20 days will be required between January 15 and March 15 to carry out the work.

ERDOLCHEMIE BUILDS TAME UNIT

Erdolchemie has begun construction at Cologne of an 8,000 ton/year production unit for tertiary amyl methyl ether (TAME) and isoamylenes. The two-stage plant is set to go on stream in 1989.

Feedstock for isoamylene production will be pyrolysis benzene from the company's ethylene plant. The TAME produced in the preliminary stage will be processed to 99 per cent isoamyl-

ene using technology developed by the Bayer-PP joint venture and tested in a 1,200 ton/year semi-commercial plant started up at the end of 1985.

While TAME is used primarily as a high-octane component of unleaded gasoline, isoamylenes are used to produce a number of chemical intermediates, including flavour enhancers and aromas, glues, crop protection agents, catalysts for hydrogen synthesis, alkalization materials for phenols and cresols and 2-methyl-butene, a comonomer for olefines production.

CHEVRON/BP DEAL

Chevron Chemical Co. has exercised the option it has held since 1985 to use BP's gas-phase fluid bed process in a 200,000 ton/year linear low density polyethylene plant.

Engineering of the plant, which will be sited at one of Chevron Chemical's two locations in Orange and Cedar Bayou, Texas, and use two reactors, will begin shortly with final approval for construction scheduled for mid 1988. Current plans call for the unit to start up by early 1991 and to produce both lldPE and hdPE.

Chevron currently has capacities for 420,000 ton/year of conventional low density and 250,000 ton/year of high density polyethylene.

MOBIL IN FRANCE

Mobil Chemical Co. has selected a site in Europe to build a new polyalpha olefins-based synthetic lubricants plant. The company is investing about FF70m (\$12m) in the plant at its Notre-Dame-de-Gravenchon refinery, near Le Havre, France.

The unit, which will boost the company's capacity by 60 per cent, is due to begin production in early 1989.

The lubricants are marketed to the automotive, aviation, marine and industrial markets.

JORDAN PLANS TWO PHOS ACID PLANTS

Phosphate-rich Jordan is negotiating to build two export-oriented phosphoric acid plants in Aqaba. The first proposal now under study by the Jordan Phosphates Mines Co. (JPM) concerns the setting up of a plant in a joint venture with India's EID Parry.

Dr. Isac Jalad, assistant general manager of JPM, said that the plan is to finalize discussions by the first quarter of 1988 for the plant which would produce around 500-600 ton/day of phosphoric acid expressed as 100 per cent P_2O_5 .

The second proposal, which has been under study for the past three months, has been received from the Soviet Union, Dr. Jalad said.

The USSR, which is known to want to secure supplies of as much phosphate and/or phosphate intermediates as possible because of its own declining Kola stocks, has proposed to build the complete turnkey, 500-600 ton/day P_2O_5 phosphoric acid unit as well as a superphosphoric acid plant in return for deliveries of the finished product. The USSR, which would use its own process, is currently testing Jordanian phosphate rock.

The USSR is also proposing to supply technology and equipment for a 60,000 ton/year di-calcium phosphate unit, also planned at Aqaba. The product, an animal feed supplement,

would be sold on the Jordanian and surrounding export markets.

Jordan does not need extra phosphoric acid to feed its own diammonium phosphate plant at Aquaba. JPB, which now owns Jordan Fertilizer Industries, is trying to bring to the full 415,000 ton/year P_2O_5 capacity its existing phosphoric acid unit. The plant, supplied by Spie Batignolles of France, has been working at 65-75 per cent of nameplate capacity. The French contractor is trying to resolve the problem.

AUSTRALIA PLANS NEW COMPLEX

Petrochemical Industries Co. of Western Australia has completed a feasibility study into an Aus. \$ 750m (\$ 520m) petrochemical project at Kwinana.

The petrochemical complex will consist of three plants: an ethane cracker producing 145,000 ton/year of ethylene, a chloralkali facility with a capacity to provide 200,000 ton/year of caustic soda and a plant to produce 300,000 ton/year of vinyl chloride monomer.

An agreement has been signed between PIC and the South Korean consortium Lucky Goldstar Industrial for the export of 140,000 ton/year of the product.

NL CHEMICALS CONVERTS BELGIAN TiO_2 PLANT

NL Chemicals, the world's fourth largest producer of titanium dioxide, is investing BF 2.1 bn (\$ 60.3m) in a project to convert the Langerbrugge, near Ghent, Belgium, plant to the chloride route. Announcing the project Fred Montanari, president of NL Chemicals Inc, stressed the environmental advan-

tages of this method of making TiO_2 .

The 40,000 ton/year will replace the existing NL Chemicals sulphate equipment on the same site where TiO_2 has been manufactured since 1957. The new plant will contain the latest technology, much of it developed by NL Chemicals.

Environmental benefits include mainly that all dumped spent acid wastes in the North Sea will cease and SO_2 emissions from the plant will be reduced by 90 per cent.

The Belgian undertaking is part of a \$ 200m worldwide capital expenditure programme by NL Chemicals aimed at providing maximum environmental protection at all the company's facilities. However, Montanari expressed concern that a few companies were usually carrying out these programmes. It has been announced, he said, that two NL Chemicals' competitors, in the UK and France, were contemplating expansion of their facilities, while still discharging waste acid into estuaries.

Until there was effective harmonisation of effluent disposal standards for titanium dioxide pigment plants, he added, NL Chemicals faced the threat of being unable to compete in the international market with materials from countries not subject to similar environmental standards.

NL Chemicals has a total capacity of 317,000 ton/year of TiO_2 . It operates plants in Germany (175,000 ton/year), Belgium (40,000 ton/year), Canada (26,000 ton/year) and Canada (76,000 ton/year).

the group mines ilmenite in Norway and has further specialty chemicals operations throughout the world. Current revenues are around \$850m. The company estimates the market growth rate at 1.5 per cent/year.

\$200m. modernization programme includes the construction of a new chloride process plant at Varennes, Quebec, Canada; waste acid concentration and sulphate process conversion at Nordenham in Germany; chloride and waste conversion with waste concentration unit in partnership with Sachtleben in Lemsy, West Germany; waste neutralization with land-filling in Norway; and the Mellebruggen, Belgium conversion.

Chemical's TiO_2 pigments marketed in Europe and North America under the **Kronos** and **Titanox** trademarks, names arising from NL Chemical being the successor to separate companies which simultaneously invented, developed and commercialized TiO_2 pigments in the 1920s.

S BUILDS ACRYLATES COMPLEX

West Germany's Huls has announced plans to build a 100 ton/year plant for acrylic acid and acrylic acid esters in Marl, using technology licensed from Mitsubishi Petrochemical Co. The licence also grants Huls marketing rights for the product not needed for capacity use.

The unit will use the process of direct oxidation of propylene. Mitsubishi will provide

basic engineering and Huls will supply the oxidation catalyst.

The new plant is one of two production facilities for polymers starting materials specified in the Veba subsidiary's capital spending budget for 1988. The plants are said to represent the major portion of the DM 370m set aside for new and expansion of existing facilities.

Huls points to a growing market for acrylic acid derivatives. The new plant will provide some competition for German and world market leader BASF, which will have worldwide capacities for 450,000 ton/year of acrylic acid and acrylic acid esters following the completion of a second production unit, worth DM 100m, at Ludwigshafen. This plant will also use the propylene oxidation process.

Applications for acrylic acid derivatives include the new acrylic polymers used in phosphate-free detergents and super absorbent hygiene products.

LURGI WINS HYDROGEN ORDER IN KUWAIT

Lurgi has received a contract to build a hydrogen recycling plant at the Shuaiba fertiliser complex in Kuwait operated by Petrochemical Industries Co. (PIC). Set to go on stream in late 1988 using low-temperature technology, the unit will reprocess 16,000 m³/hour of hydrogen from purge gas of the PIC ammonia synthesis plant. Lurgi will use equipment patented by East Germany's VEB K  mplete Chemie-anlagen, based in Dresden.

DRESSER TO ACQUIRE KELLOGG FOR \$100M

Dresser Industries Inc, a Dallas-based oil services firm, has

signed a letter of intent to acquire the assets and business of the M.W. Kellogg Co., a wholly-owned subsidiary of The Henley Group Inc, of La Jolla, California. Dresser will pay \$100m in cash and assume some of Kellogg's debt.

According to the companies, it is anticipated that a definitive agreement will be concluded shortly and that the acquisition will be effective in January 1988, subject to approval of appropriate governmental agencies.

Kellogg is a world leader in the process engineering and construction management business, with annual revenues in excess of \$900m. Headquartered in Houston, Texas, Kellogg employs approximately 3,000 people — 2,300 in Houston and 700 in its European headquarters in London. In addition it has project and liaison offices around the world.

John Murphy, Dresser chairman and president, called the Kellogg acquisition "another major step in our programme to increase our focus on energy-related business."

Murphy pointed out that Dresser has been "divesting non-core businesses and redeploying assets through acquisitions and internal development programmes to those higher technology areas in which we have the greatest experience and expertise."

He said Dresser is in "excellent financial condition," with total debt only 18 per cent of total capitalization, and "we have generated additional cash by selling two financial service holdings in recent weeks." The Kellogg acquisition will be fin-

anced from internal funds, he added.

Dresser is a major worldwide supplier of products and services for industries involved in petroleum and natural gas exploration and development, energy processing and conversion, and mining and construction.

"We are in an upbeat mood. We work in the same industry, we are familiar with them and they with us," said Kellogg's spokesman Ray Waters.

Dresser Industries becomes Kellogg's sixth parent. Founded in 1901, Kellogg remained independent until 1944 when it was bought by Pullman Inc of Chicago. In 1980 Pullman was acquired by Wheelabrator-Frye. The next ownership change occurred in 1983 when Wheelabrator-Frye was acquired by the Signal Companies.

Kellogg remained a subsidiary of Signal until 1985 when Signal merged with the Allied Corp. to form Allied-Signal.

In May 1986 Kellogg became a subsidiary of the Henley Group, which was created when Allied-Signal spun off 35 of its non-strategic businesses.

HOECHST & HIMONT MAY SEAL PP TECHNOLOGY ACCORD

Himont and Hoechst are currently negotiating a technical deal for polypropylene. Details of the potential agreement have not been revealed but they are likely to involve close pooling of technical research information for compounding technologies. The deal could be similar to one signed recently by BASF, ICI and National Distillers. The two companies would be obliged to put forward their pro-

posals to the European commission's competition arm DG IV, but no formal approach has yet been made to Brussels.

The two firms have a history of co-operation including the agreement to link up for a polypropylene plant in Tarragona belonging to a Repsol/Hoechst joint venture. This plant will use Himont's bulk loop Spheripol process. Hoechst also produces highly stereospecific catalysts under licence from Himont.

Catalyst technology is one of the key elements in the Spheripol process. But even the slurry process can benefit from the use of the Himont/Mitsui catalyst system as several sections of the facility can be removed. The benefits are even greater for purpose-built units still using slurry process.

One possible benefit of closer co-operation between Himont and Hoechst could be that the West German company's opportunity to sell licences for its own proprietary technology could be enhanced. Hoechst is believed to be concerned that its own technology is becoming outmoded while admiring the Italian company's process.

The previously announced polypropylene plant planned by Hoechst France at Lillebonne, will have a capacity of 120,000 ton/year. Due to technology considerations, the project has been delayed slightly and is now planned to come on stream in the second half of 1989.

The unit will probably replace the existing 65,000 ton/year plant at the site although this decision will be dictated by the market situation. Tech-

nology for the new plant has not yet been chosen.

Hoechst's 100,000 ton/year joint venture plant with Repsol at Tarragona in Spain will be based on the Himont process. The plant, now well advanced, is planned on stream by the end of 1989.

GRACE OPENS CHINESE PLANT

W.R. Grace has opened its first speciality chemical plant in the People's Republic of China. The plant, which cost \$1.2m, will manufacture up to 600 ton/year of various organic compounds. W.R. Grace is planning to invest a further \$3m at the plant over the next five years, according to a statement by China president William Kinch.

Raw materials for the plant will be obtained locally and transported. The compound produced will be used to support China's growing food and beverage industry and will double the country's production of canned food from 2bn to more than 4bn. Canned food is a major export from China but the country lacks modern canning technology.

The ability of Grace to transfer technology prompted the Chinese government to grant the firm "technologically advanced company" status, which means that the wholly owned subsidiary will receive tax breaks including a 15% corporate tax instead of the usual 33 per cent. In addition, the firm will be paid in local currency.

Grace China is also seeking for loans from Chinese

Biotechnology

MYERS STARTS AIDS VACCINE TEST

Officials at the US food and drug administration have given Bristol-Myers the go-ahead to test the vaccine in human beings of various ages. This experimental vaccine, developed by Oncogen, is the second to win FDA approval.

The company is now recruiting volunteers to test whether the vaccine is both safe and effective in producing an immune response. The vaccine is based on the vaccinia virus with two key AIDS virus proteins incorporated. There is no danger that volunteers will contract the disease, the company claims.

A control experiment using a smallpox vaccine will be conducted concurrently. None of the volunteers will be AIDS carriers, the company stressed.

Animal tests indicate that the experimental vaccine is able to decrease the impact of AIDS infection between five-and ten-fold, increase antibody production and showed no adverse side reactions. Bristol-Myers claims that a great deal of work still needs to be completed before it will apply for a new drug application.

CELLTECH REVEALS SHARE ISSUE

Biotechnology concern Celltech, is going ahead with its planned international share

placing to raise £45m (\$81m). The main purpose of the share deal is to finance the development of Celltech into a fully-fledged biopharmaceuticals co. The placing has been arranged by Baring Brothers and the new shares were issued at £4/share.

Celltech's chief executive Gerard Fairtlough said, "Despite the unsatisfactory market conditions, the response from potential investors has been very encouraging, particularly in Japan, the UK and continental Europe. Our existing shareholders have been highly supportive and we fully expect to raise the targeted funds."

The company believes it will be more profitable to commercialize its own products. In the future it expects to retain the marketing rights to its most promising products, finance their development and clinical trials, and ultimately carry out marketing of successful items in key West European sectors, namely hospital and intensive care markets. By employing direct retail to hospitals the sales force can be minimized.

Last month the company announced operating profits of £661,000, the first profits in its seven-year history. Revenue from the sale of products and sponsored development businesses increased five-fold to £4.11m. Biopharmaceutical development costs totalled £3.45m for the year ended September 30. Net profits rose to £234,000 on an £11.41m turnover compared with a loss of £2.08m on sales of £7.6m in 1987.

CANADA AMENDS PATENTS LAW

Drug Patent legislation that has recently been passed in the Canadian Senate means up to ten years of market exclusivity for new drugs.

The bill is expected to be welcomed by foreign drug manufacturers. Until now they have had to cope with a system of compulsory foreign licensing. This law resulted in a situation where once a manufacturer receives government approval for a drug, a competitor can ask for a licence to manufacture the same drug subject only to low level royalty payments.

The new legislation calls for the establishment of a Drug prices review board to monitor prices and order rollbacks if they consider the prices excessively high.

Consumer groups and generic drug manufacturers claim the legislation will push up the price of drugs in Canada. The US chemical manufacturers association claims that the old compulsory licensing damaged sales and reduced research and development investment in Canada.

Drug multinationals have now promised to increase their R & D spending in Canada to 10 per cent of annual sales within the next ten years. More than Can \$800m (\$600m) in investments in research facilities have been announced on condition of the bill's passage.

The law passed after the Liberal majority in the Senate abstained, led by Liberal MPs from Montreal.

DUTCH FIRM FORMS BIOTECH VENTURE

The Dutch farm co-operative Cehave is setting up a biotechnology branch with investments of Dfl. 40 m. (\$ 21.4m) in 1988. One of these investments will consist of a Dfl. 5 m laboratory for research on improving the ways in which animals take up and digest food.

Other research fields will include animal health and breeding techniques. Cehave has been working on environment-friendlier cattle-feeding for a number of years, resulting in chicken- and pig-feed with 10 to 15 per cent less phosphate.

Cehave's research plans include co-operation agreements with the technological institute TNO and Wageningen, the agricultural university.

DU PONT SETS UP AIDS DRUG JV

Du Pont has established joint venture agreement with the US biotechnology concern HEM Research to develop and market **Ampligen**, a potential anti-acid drug currently in clinical trials. The move makes a break from tradition at Du Pont which has previously had only limited marketing agreements with biotechnology companies.

The project is much more significant for Du Pont as **Ampligen** has already been shown in pilot studies to be a successful therapy for Aids victims without discernible side effects. Du Pont has taken a minority stake in HEM as well as rights to negotiate a worldwide development, manufacturing and marketing agreement.

The drug is currently going more extended trials on 200 patients suffering from related complex and other Aids conditions.

Results, due early in the year, will echo the encouraging results already seen. Du Pont plans to build on the successful progress of its clinical trials.

Meanwhile, Du Pont has entered an agreement with a Pennsylvania-based American firm for the company's Aids diagnostic product. The deal gives Du Pont worldwide marketing rights. Bionetic's Wesblot system automates manual laboratory procedures for the detection of the Aids virus.

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Environment

SED TO UNVEIL BIOTECHNOLOGY VE

is hoping to present European environment with its proposals for a regulating the deliberate release of genetically altered organisms later this month. Other planned directives to biotechnology are still under discussion and are unlikely to be settled until next month. The environment minister is to be presented with the draft directive at the next meeting. Drawn up by the commission's environment directorate DG XI, the draft directive plans to establish notification and endorsement procedures for the planned release of genetically engineered organisms into the environment. The commission is proposing that companies wishing to release genetically engineered organisms into the environment for commercial purposes should not seek endorsement from competent member state authorities. Companies planning to market genetically engineered organisms will have a standard procedure. The commission is planning to produce a procedure similar to the so called sixth amendment which regulates the classification, labelling and packaging of dangerous substances. Endorsement would first be required at a national level with a period for international consultation. The draft directive has received approval from the environment council. The commission will start to produce an annex laying down the informa-

tion for a common standard of review within the EEC. Developing the directive has not been an easy task for the commission and some problems will need to be solved.

The commission is only proposing an endorsement procedure rather than one for approval. "This definition was the subject of intense discussion," explained a commission source. Strongest objections may still come from the West Germans who are keen to introduce a five-year moratorium on deliberate release.

DG XI and the commission's industrial affairs arm DG III have decided to merge their proposals for containment guidelines into one directive. Originally the two groups had planned to introduce separate guidelines but now the merged draft, which will also contain provisions for accident control, will be submitted to a meeting of member state experts this month.

Expert committees do not always endorse commission proposals. At a recent meeting to discuss the proposals from DG V for worker protection, the experts are believed to have criticized the commission "heavily." The commission is now having to return to the drawing board for this directive. Originally Brussels had hoped to submit all directives at the end of the summer.

BASF SPILL

Environmental authorities in the West German state of Rhineland-Palatinate have criticized BASF for its failure to report promptly a spill of the fun-

gicide vinclozoline into the Rhine late last month.

The environmental ministry said that the company's delay of more than 24 hours in reporting the accidental discharge had resulted in a delay in the International Rhine alarm.

ITALY SETS UP POLLUTION TEAM

Italy's environment protection minister Giorgio Ruffolo has established a special investigation committee to enquire into the Farmopiant case, after the Montedison concern announced lay offs and closure of its entire plant at Massa Carrara.

Farmopiant, the pesticide arm of Montedison, closed the plant in protest against local authorities' denial to renew authorization for the production of pesticides. This decision by the authorities was in response to a recent referendum that supported closure. The committee is to study the potential hazards at the plant.

Meanwhile, the European investment bank has advanced L98.5 bn (\$ 84.1 m.) for environmental projects in Italy. Of this total, L65 bn. will go towards waste water treatment works to reduce pollution in the River Po and L4.5 bn. for the construction of waste water treatment plants at Scanno and for the improvement of water supplies in Teramo.

ALLELIX LINKS WITH CYANAMID

Allelix of Mississauga, Ontario has signed an agreement with Cyanamid Canada to develop new varieties of oilseed rape resistant to imidazolinone herbicides. As these herbicides are

dioxin-free they are likely to be popular with farmers.

The Canadian biotechnology firm claims that it is "two to three years away" from developing a hybrid variety of oil-seed rape which will yield 15 to 30 per cent more oil than current varieties. The partners have not disclosed the financial terms of the deal.

Cyanamid is hoping that the development of herbicide resistant crop varieties will boost the market for its imidazolinine class.

GERMAN MAJORS EARMARK \$36M FOR ENVIRONMENT

West German chemical majors Bayer and BASF have re-

vealed plans to spend several billion Deutschmarks on environmental protection over the next five to 10 years.

The investments are being made to comply with recent German legislation and anticipated changes in environmental laws announced by the government following the Sandoz fire last year. However, the companies say that in many cases their improvements go beyond legal requirements.

Bayer is planning to spend DM 3bn. (\$1.75bn.) at its German plants over the next five to eight years. Around a third of the funds will be pumped into wastewater purification facilities, an additional DM 1bn. will be spent on emissions control and the remaining third on

new sewage canals, circuit cooling water systems, storage facilities and improvements in plant safety.

Wastewater purification projects include a new network — completely underground — at the Leverkusen main works. Installation of a new system, which Bayer calls "canal 2000," will cost DM 200m. It is modelled on the system already in use at the Brunsbittel plant, in which production wastes are collected above ground to collect before being piped underground to a biological treatment system. Improvements to wastewater treatment systems at Elberfeld, Ulfen and Dormagen are also planned.

Bayer's waste incineration plants are also being revamped in part to accommodate hazardous wastes formerly burned at sea. The incineration plant at Leverkusen is currently being revamped at a cost of DM 100m. A new plant costing DM 150m is under construction at Leverkusen and a DM 80m plant at the Dormagen works is in the drawing board.

The cost of operating environmental protection equipment has exceeded Bayer's total dividend since 1977, the company says. Some 10-15 per cent of its total expenditure budget is used for environmental protection over the past five years. Bayer says it spent DM 1.2bn on worldwide environmental research in 1986, including DM 260m in West Germany.

BASF meanwhile has announced plans to invest DM 200m in environmental protection at its main works at Leverkusen over the next 10 years.

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COMPANY NOTES

AL FERTILISERS

al Fertilizers Limited has achieved record production for the first nine months of the current financial year. The company has produced 455,368 kg of nitrogenous fertilisers against the target of 400,630 kg upto December 1987 — 113 per cent of the target. Production this year has increased by 17.2 per cent over the corresponding period last year. Production at all the units of the company has exceeded their respective targets upto December 1987 and established an increase over the corresponding period of last year by 6.7 per cent at Nanpura, 7 per cent at Panipat and 1 per cent at Bhatinda.

ARI FERTILISERS

ari Fertilisers and Chemicals has fared well in the half year ended September, 1987. The company has turned the corner with a net profit of Rs. 41.32 lakhs against the net loss of Rs. 27.71 crores against Rs. 27.71 crores. There is again no provision for depreciation and on this, the company's DAP production plant at Kakinada with a installed capacity of 31 lakh kg per annum is scheduled to be commissioned by the mid of January.

AB CHEMICALS

anjab Chemicals and Pharmaceuticals has turned the corner in the half year ended September, 1987, with a gross profit

of Rs. 52.39 lakhs against the gross loss of Rs. 3.35 lakhs in the corresponding period of last year. The turnover has risen to Rs. 2.56 crores from Rs. 1.64 crores. After providing Rs. 20 lakhs (Rs. 16.03 lakhs) for depreciation and Rs. 3 lakhs (nil) for taxation, there is a net profit of Rs. 28.90 lakhs against a net loss of Rs. 22.07 lakhs.

VIVID EXPORTS

The company, which is one of the 13-company Vivid Group, having exported dyes worth Rs. 14.5 lakhs and intermediates worth Rs. 17 lakhs in 1985, stepped up

its performance by exporting products worth Rs. 1.45 crores in the year ended March 1987. During the first 9 months in the current 1987-88 year, exports have amounted to over Rs. 2.50 crores and are expected to reach Rs. 3.50 crores by the year end. The projection for 1989-90 is Rs. 18 crores.

Export potential for small-scale sector in dyes and dye intermediates is sky-high and the SSI units should take full advantage of this opportunity by offering right quality products and by keeping the delivery time schedule, according to Mr. Sudhir Mody, chairman of the company.

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(Blocks) KUPWAD-416 425
Dist Sangli, (Maharashtra).

ing and ware-housing facilities are the four critical areas for boosting exports, according to him.

KOTHARI INDUSTRIAL

Kothari Industrial Corporation expects to fare well in the current year ending June, 1988, and return to the dividend list. This is on account of the sale of its chemical unit and an expected improvement in its plantation, fertiliser and textile divisions.

With the sale of its chemical unit to SPIC, there has been a transfer of term loan liability of Rs. 19.23 crores due to which the interest burden will be reduced by Rs. 2.60 crores. Steps have also been taken to improve its performance by reducing costs including labour rationali-

sation, which will result in an annual saving of Rs. 90 lakhs.

According to projections, the output of tea for the year is expected to be 3 million kg (2.38 million kg) and that of superphosphate fertiliser at 45,000 tonnes (35,508 tonnes). The fertiliser capacity has been doubled, which will result in increased profitability.

CITURGIA BIOCHEM

Citurgia Biochemicals has achieved satisfactory working results for the six months ended September, 1987, despite work being affected during the period by a go-slow at its citric acid plant in Surat. The dispute has since been resolved. During the six months, sales and other income have been higher at Rs. 11.08 crores against

Rs. 9.79 crores in the corresponding period last year. The profit has been marginal at Rs. 2.38 crores against 2.30 crores.

After providing Rs. 90 lakhs (Rs. 90 lakhs) for depreciation and Rs. 79 lakhs (Rs. 50 lakhs) for taxation, the net profit declined to Rs. 68 lakhs (Rs. 89 lakhs). For the whole of last year, the company earned a net profit of Rs. 2.43 crores.

CIPLA RESULTS

Cipla has achieved satisfactory working results for the six months ended October, 1987. Sales and other income have been higher at Rs. 24 crores compared to Rs. 21.78 crores in the corresponding period last year. The gross profit has risen to Rs. 2.10 crores from 1.82 crores.

After providing a higher amount for depreciation at Rs. 50 crores (Rs. 50 lakhs) and Rs. 31 lakhs (Rs. 31 lakhs) for taxation, there is a net profit of Rs. 1.101 crores against Rs. 1.85 crores for the whole of last year.

VAM ORGANIC

Vam Organic Chemicals fared well during the six months ended October, 1987, with sales and other income rising to Rs. 15.86 crores from Rs. 14.25 crores in the corresponding period last year, and the gross profit was also higher at Rs. 4.65 crores against Rs. 4.22 crores.

After providing Rs. 1.42 crores (Rs. 2.41 crores) for depreciation and Rs. 85 lakhs (Rs. 85 lakhs) for taxation, there was a higher net profit of Rs. 2.10 crores against Rs. 1.49 crores for the whole of last year, the company earned a net profit of Rs. 3.49 crores.

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MARKET INFORMATION

Copper & Cyclohexanone Up

station transport strike be-
 ted by their local counter-
 partially paralysed the che-
 et. Further the building
 the main street of the mar-
 a closure of all business
 2 days.

The prevalent shortage of Trichloro-
 ethylene and methylene dichloride per-
 sists due to irregular supplies from the
 south.
 The demand for cyclohexanone has
 increased its price, and the rise in
 the copper price has resulted in a

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 spondent — and, as such they are
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 lished only with a view to giving
 some ideas of market conditions.
 The prices are inclusive of Ex-
 cise and Maharashtra Sales Tax.

price increase of all its salts.
 The local depots of acrylamide and
 xylene have stopped supplies.
 Dyes market remains steady.

(Prices as on 31st December, 1987)

AL CHEMICALS	Per kg.				
sulphate	2.00	Boric acid (Tech.)	21.00	Cream of Tartar (Tech.)	84.00
phosphate (Mono)	14.50	Bisphenol-A	58.00	Citric acid (Belgium)	40.00
phosphate (DI)	12.00	Butyl carbitol	35.00	Citric acid (Indian)	39.50
carbonate (DI)	17.00	Caustic soda (Flakes)	8.25	Copper sulphate	17.00
bicarbonate	4.75	Caustic soda (Solid)	7.75	Chromic acid	50.00
chloride	3.50	Caustic soda (Lye)	6.00	Cyanuric chloride	120.00
nitrate	4.00	Calcium chloride 70% (solid)	3.25	Cobalt oxide	280.00
ite powder	21.00	Calcium chloride 75-80%		Carbitol	52.00
	56.00	(fused)	3.50	Dicalcium phosphate	
arbonate	6.00	Calcium chloride 98%	6.00	(Anhydrous)	16.00
powder (33% Cl)	3.75	(Anhydrous)	3.00	Ferric chloride (Lumps)	6.00
anular)	15.00	Calcium carbonate (PPT)	3.55	Ethylene urea	58.00
nder)	15.50	Calcium carbonate (Activated)	80.00	Glue flakes	8.45
		Camphor (Indian)	50.00	Glue sheets	6.75
		Cresylic acid		Gohsenol GH 17	72.00

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Hyflosupercell	19+ST	Santobrite (Indian)	36.00	Carbon Tetrachloride	
Hexamine	29.00	Soda Ash (Tata)	3.90	Cyclohexanone	
Industrial Wax	25.00	Soda Ash (Birla)	3.75	Cyclohexanol	
Litharge	15.00	Soda Ash (Imp.)	3.50	Diacetone	
Lead Acetate (Tech.)	28.00	Sodium bicarbonate	5.25	Diethylene glycol (DEG)	
Lithopone	15.00	Sodium bisulphite	4.50	Diethyl Phthalate	
Magnesium chloride (crystal)	2.00	Sodium silicate	3.00	Diallyl Phthalate	
Menthol crystal (Flakes)	185+Ex.+ST	Sodium acetate	5.90	Dimethyl Phthalate	
Menthol bold	205+Ex.+ST	Sodium alginate	220+ST	Diethyl Adipate	
Menthol crystal bold	245+Ex.+ST	Titanium Dioxide (Anatase)	52+ST	Dibutyl Adipate	
Magnesium carbonate (Japan)	16.00	Titanium Dioxide		Dipentene	
Magnesium carbonate (Indian)	15.00	(Rutile. — RCR ₂)	60+ST	Dimethylamine 40%	
Maleic Anhydride (per kg)	38.00	Tartaric acid (Crystal)	94.00	Dimethylamine 60%	
Mercury (75 lbs.)	9,000.00	Trisodium phosphate	4.80	Ethyl Acetate	
Nickel chloride	60.00	Thiourea	65+ST	Ethyl Acrylate	
Oxalic acid	20.00	Urea (Tech)	2.75	Ethylene Dichloride	
Peppermint oil (Rectified)	90+Ex.+ST	Vacuum salt	1.00	Ethylene Glycol	
Potassium carbonate (Indian)	19.00	Zinc Dust	30.00	Formic Acid (Imp.)	
Potassium carbonate (Imported)	21.00	Zinc Oxide	30.00	Formaldehyde	
Potassium bichromate	22.00	Zinc chloride powder		Glycerine (CP)	
Potassium phosphate (Mono)	14.00	(technical)	14.00	Glycerine (IW)	
Potassium phosphate (Di)	14.00	Zinc sulphate	3.90	Hydrogen peroxide 50%	
Polyvinyl alcohol (No. 117)	88.00			Iso Propyl Alcohol	
Polyvinyl alcohol (No. 173)	84.50			Iso Butyl Alcohol	
Polyvinyl alcohol (No. 208)	93.00			Monoethanolamine	
Paraformaldehyde	16.00			Morpholine (Indian)	
Phthalic anhydride 96%	23.25			Melamine	
Pentaerythritol	60.00			Methyl Ethyl Ketone	
Paraffin wax	13.50			Methyl Isobutyl Ketone	
Rangolite (German)	70.00			Methyl Acrylate	
Rangolite (Czech.)	46.00			Methylene Dichloride	
Sodium sulphate (Fine)	4.00			Meta Cresol	
Sodium sulphate (Coarse)	3.80			Nitrobenzene	
Sodium sulphide 50-52%				Nitric Acid (Con.) (RCF)	
(Flakes)	8.00			Ortho Cresol	
Sodium sulphide 58-60%				Phenol	
(Flakes)	9.00			Propylene Glycol	
Sodium sulphide pure (Flakes)	12.25			Polyethylene Glycol (No. 1)	
Sodium nitrite	13.25			Polyethylene Glycol (No. 2)	
Sodium chlorite 80% (Spain)	90.00			Polyethylene Glycol (No. 3)	
				Polyethylene Glycol (No. 4)	
				Polyethylene Glycol (No. 5)	
				Polyethylene Glycol (No. 6)	
				Polyethylene Glycol (No. 7)	
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				Polyethylene Glycol (No. 9)	
				Polyethylene Glycol (No. 10)	
				Polyethylene Glycol (No. 11)	
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Alpha Naphthol (Imp.)	155.00
Aceto Acetic Ester (Methyl)	65.00
Ammonium Molybdate	170.00
Anthraquinone	80.00

Anthranilic Acid	60.00	N-Methyl J. Acid	3
2-Amino-4-Nitrophenol (Imp.)	140.00	N-Methyl Aniline	1
Blue B. Base (Local)	235.00	Napthalene crude	
Beta Naphthol (Atul)	58.00	Napthalene (Refined)	
Benzidine Dihydrochloride (BDH)	70.00	Ortho Anisidine (OA Imp.)	
Bromamine Acid	375.00	Ortho Dichloro Benzene (OBCB)	
BON Acid	107.00	OT Base	
Chicago Acid	280.00	Para Dichloro Benzene (PDCB)	
Coach Acid	58.00	Para Anisidine (PA-Imp.)	11
C. Acid (Imp.)	260.00	Para Anisidine (PA-Local)	8
Cyanuric Chloride (Japan)	120.00	PNA	6
2, 4, DNCB	26.00	Para Cresidine (Imp.)	32
Dihydrothio PTOS (Imp.)	500.00	Para Amino Azo Benzene (India)	12
Dimethyl Aniline	58.00	PNCB	2
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3, 3-DCB (Imp.)	155.00	Phenyl J. Acid	34
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H. Acid (Atul)	150.00	PT Base	8
G. Salt	56.00	Rhoduline Acid	50
Isophthalic Acid	39.00	Resist Salt	1
J. Acid	270.00	Resorcinol	13
J. Acid Urea	270.00	Sodium-Naphthionate	6
K. Acid	95.00	5-Sulpho-Anthranilic Acid	6
MDPS (German)	200.00	Sulpho Tobias Acid	100
MNA	75.00	Sulphanilic Acid	20
Meta Urido Aniline	135.00	Trichloro Benzene (TCB)	15
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(Prices as on 31st December, 1987)

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Acid Maroon V	110.00	Blue G	170.50	Rubine 3B	2
Acid Orange II	77.80	Sky Blue FB	188.25	Rubine CB	3
Acid Orange IIV	63.06	Copper Blue GR	147.00	Blue GL	3
Acid Red A	107.25	Fast Greenish Blue GL	114.60	Blue BGF	6
Cresol Scarlet MUE	155.00	Developed Black BT	116.10	Navy Blue RE	2
Acid Scarlet 3R	99.90	Blue NB-2B	300.20	Brown 3REL	2
Acid Red 38N	135.00	Blue NB-2BC	185.30	Black GEL	3
Acid Red R2R	132.00	Developed Black NB-BHB	185.30	Dark Brown 3B	3
Acid Red RS	88.00	Green B	111.65	BASE COLOURS	
Acid Green V	230.00	Green NB-B	188.25	Fast Yellow GC	F
Acid Patent Blue AS	250.00	Green 2B-N	188.25	Fast Orange GC	
Acid Coomast Blue	208.00	Brown MR	154.40	Fast Scarlet R	1
Acid Yellow 5GN	65.00	Brown CN	107.25	Fast Scarlet RC	1
Acid Red PG	85.00	Golden Brown G	140.35	Fast Scarlet RC	
Acid Red GRS	78.00	Catechin G	120.50	Fast Scarlet RCR	
Acid Black 10 BX	121.95	Omega Tan	126.40	Fast Scarlet G	
Acid Black BX	98.40	Catechin GS	102.80	Fast Scarlet GN	
Acid Black Wax	135.50	Black E Hly Cono.	142.60	Fast Scarlet GG	
Procionil Yellow GS		Black E Extra Hly Cono.	142.60	Fast Scarlet GGS	
(I.C.I., UK)	265.00	Black NB-ER Hly. Cono.	310.50	Fast Red B	
Procionil Red GS (I.C.I., UK)	530.00	DISPERSOL COLOURS		Fast Red RC	
Procionil Blue RS (I.C.I., UK)	315.00	Per Kg		Fast Red R Flakes	
Procionil Scarlet G		Yellow 6G Powder	143.80	Fast Red TR	
(I.C.I., UK)	300.00	Red B 3B Powder	247.80	Fast Red TR Oil	
Procionil Orange G		Red B 2B Powder	323.20	Fast Red RL	
(I.C.I., UK)	250.00	Red CB Powder	439.15	Fast Red KB Oil	
Procionil Rubine (I.C.I., UK)	550.00	Red D2B Powder	477.40	Fast Bordeaux GP	
DIRECT COLOURS		Violet C 4R	521.90	Fast Garnet GBC	
Per Kg		Blue BG Powder	235.45	Fast Violet B	
Yellow 3GX	88.10	Blue BN Powder	103.75	Fast Blue BB	
Sun Yellow RCH	124.40	Blue D 2R Powder	476.25	NAPHTHOL COLOURS	
Fast Yellow GCH	141.15	Navy BT Powder	243.90	ASG	
Yellow CFG Hly. Cono.	312.00	Blue B 2G Powder	210.20	AS	
Fast Yellow GS	111.65	Black BT Powder	182.60	ASSW	
Fast Yellow CHR8	95.45	Blue BR Powder	390.20	ABBS	
Viscose Orange A	166.15	Yellow 7GL	338.60	ASBO	
Fast Orange GR	133.75	Yellow 5RX	218.80	ASD	
Red	96.90	Yellow 3G	367.25	ASOL	
Dark Tan	78.25	Yellow	140.00	ASTR	
Red IIR	72.55	Yellow AL	135.30	ASPH	
Red 4B	169.10	Yellow Brown REL	247.50	ASE	
Bordeaux BW	132.30	Yellow FFL	463.60	ASEI	
Fast Scarlet 4BS	186.55	Gold Yellow GG	259.70	ASLB	
Red 12B	170.55	Pink REL	247.00	ASBT	
Bordeaux Hly Cono.	194.00	Red REL	468.65	ASWG	
Cotton Red N	117.05	Red 2B	327.40	ASSG	
Brill. Fast Hello B	278.00	Red FB	324.20	ASSR	
Brill. Fast Hello 2B	297.00	Red Violet FBI	469.85		
Brill. Fast Hello 2RS	136.20	Orange 3R	196.65		
Brill. Fast Hello BS	116.10	Violet 3R	280.60		
		Violet 6R	486.75		

COLOURS	Per Kg.				
Yellow HR	181.80	Navy Blue M 3R	310.95	Blue R Conc. Pdr. Fine	577.65
Low H4G	117.85	Brill. Blue MR	331.70	Blue RR Supra Powder	629.35
Low H-8GP	168.55	Brill. Blue M RX	214.20	Blue Conc. Powder	645.80
Low HE6G	166.95	Brill. Blue M-G	382.30	Brill. Blue 2R Hly. Conc.	378.55
-E4R	276.05	Blue M 4GD	344.60	Brill. Blue 2R Supra Disp.	115.65
Low H7G	332.30	Navy Blue M RB	318.75	Dark Blue 2R Powder Fine	389.25
44R	243.95	Turquoise M-G	197.85	Blue BC Supra Disp.	359.40
1 GR	326.05	Brill. Blue M GX	302.50	Jade Green XBN Powder Fine	438.20
Yellow M4G	177.10	Blue 3R Acra Powder	718.20	Jade Green XBN Acra	
Low M8G	332.30	Dark Brown H 6R	248.45	Conc. Powder	823.90
M 3R	217.60	Cobalt Oxide (per kg.)	285.00	Jade Green 2G Pdr. Fine	419.65
Orange H 2R	241.85	Green H 4BD	269.80	Jade Green 2G Ptg. Paste	125.40
ed H 7B	157.95	Green H-E4BI	169.80	Jade Green XBN Ptg. Paste	126.00
Orange M 2R	313.15	Red Brown H IF	143.25	Jade Green 2G Supra Disp.	496.00
ed H 8B	169.45	Orange Brown H 2B	209.05	Olive Green B Pdr. Fine	399.90
Carlet H RN	245.05	Brown M GRN	188.80	Olive D Pdr. Fine	444.30
Red H-3BP	179.30	Black H-N	283.35	Olive Green B Supra Disp.	308.25
ed H-F3B	243.45			Jade Green XBN Supra	
Magenta HB	167.00	SULFUR COLOURS	Per Kg.	Disp. (N)	327.30
Red M 5B	98.90	Navy Blue	99.85	Olive OMW Pdr. Fine	698.55
ed M 8B	173.70	Green G	138.55	Olive OMW Supra Disp.	538.05
Pink MB	137.10	Black Grains Extra	63.05	Olive R. Pdr. Fine	422.95
Magenta MB	121.55	Black Grains OG	64.55	Olive D Supra Disp.	361.70
Purple H-3R	180.20	Black GXE Conc.	61.60	Olive R Supra Disp.	363.90
Purple H-7R	175.40	Black GXE	52.75	Olive D. Ptg. Paste	193.00
Blue H 3R	298.50	Black GXR	61.60	Olive Green B. Ptg. Paste	199.10
Blue H-GR	366.55	Black Grains 800	54.20	Olive Green B Acra Conc.	542.75
Blue H 5G	173.10	Black EXR Grains	64.55	Olive R Acra Conc.	640.00
H 5R	283.85	Black EXR Grains 800	51.25	Olive Green B Acra Conc.	542.75
Blue H 7G	178.70	VAT COLOURS (ICI)	Per Kg	Brown R Pdr. Fine	835.00
Blue H 7RX	358.15	Yellow 5G Powder Fine	673.15	Brown G. Pdr. Fine	795.00
udise HA	234.45	Yellow 5G Supra Disperse	439.30	Brown R Pdr. Fine	659.75
Blue H-3RP	335.70	Yellow 5G Acra Con.	628.75	Dark Brown 3R Pdr. Fine	685.00
Turquoise H 2GF	181.50	Yellow 3R Powder	588.85	Brown G. Supra Disp.	449.90
H-ERD	305.80	Gold Orange 3G Pdr. Fine	952.15	Brown 2G Supra Disp.	554.00
Blue H ER	258.60	Brill. Orange 6R Pdr. Fine	624.35	Brown R Supra Disp.	422.95
H 5RX	269.30	Gold Orange 3G Supra Disp.	601.30	Brown BR Powder	719.00
		Brill. Orange 6RX Powder	394.30	Dark Brown 3R Ptg. Paste	217.15
		Brill. Red 3B Pdr. Fine	997.80	Dark Brown 3R Supra Disp.	414.55
		Brill. Red 3B Supra Disp.	713.20	Brown G Acra Conc.	733.95
		Brill. Purple 4R Conc. Pdr.	470.75	Brown R Acra Conc.	766.00
		Brill. Purple 3R Acra Powder	690.85	Grey M. Powder Fine	768.80
		Brill. Purple 2R Hly Conc.	597.90	Grey M. Supra Disp.	585.45
		Brill. Purple 4R Supra Disp.	500.05	Blue BC Acra Conc. Pdr. Fine	762.70
		Brill. Purple 2R Acra Conc.	625.95	Direct Black AC Supra Disp.	330.35
		Blue R Powder Fine	542.15	Direct Black AC Pdr. Fine	474.70
		Blue BC Conc. Pdr. Fine	522.50	Direct Black CH Supra Disp.	393.20
		Blue BC Acra Conc. Pdr. Fine	762.70	Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: JAN. 1st (NNS) — Titanium dioxide suffered a fall of Rs. 3 per kg. in the local chemicals market during last week, owing to increased selling caused by shortage of money in the market, says NNS. Tartaric acid also followed suit and suffered losses by Rs. 100, whereas citric acid forged ahead by Rs. 50/100 in the wake of scarce supply. Offtake remained restricted in dyes and colours.

Titanium dioxide Anatase dropped by Rs. 3 at Rs. 53 and RC-822 eased by Re. 1 at Rs. 67 per kg. respectively in the absence of demand from consumers and nervous selling by stockists caused by acute shortage of money.

Tartaric acid nosedived by Rs. 100 at Rs. 7,450 per 50 kg. on slack demand. In the month of November tartaric acid sold higher at Rs. 8,000.

Mercury suffered losses by Rs. 100 at Rs. 8,700 on profit taking selling by stockists. Caustic soda flakes and solid drifted lower from Rs. 395 and Rs. 400 to Rs. 388/390 and Rs. 395 per 50 kg. due to improvement in arrivals.

Borax granular and crystal declined by Rs. 15 at Rs. 560 each per 50 kg. thanks to fresh offerings, whereas boric acid technical held steady at Rs. 1000 caused by tight supply. Ammonia bicarb advanced by Rs. 5 at Rs. 132 per 25 kg. in the absence of dwindling stock position along with good offtake by bakeries. Paraffin wax firmed up by Rs. 5 at Rs. 580 on tight supply and poor stock position. Other chemicals remained quiet.

Dyes and colours were quoted at their previous week levels in the absence of any worthwhile buying.

Formaldehyde (per kg.)	
Hydrogen Peroxide (per kg)	
Calcium Carbonate (per tonne)	2,600-
Acid Slurry Soft (per kg.)	
Acid Slurry Hard (per kg.)	
Phosphoric Acid (per 50 kg.)	
Pot. Nitrate (per quintal)	900-
Pot. Permanganate (per 50 kg.)	
Sod. Bichromate (per 50 kg.)	1,025-
Tri-sod. Phosphate (per 50 kg.)	31-
Titanium Dioxide Anatase (per kg)	
Titanium RC-822 (per kg)	
Zinc Oxide (per metric tonne)	30,000-3-
Phenol Carbolic Acid (per kg)	
Carbon Tetrachloride (per kg.)	
Chloroform (per kg.)	
Sodium Sulphate (per 50 kg.)	160-
Naphthalene Balls (per 50 kg)	

(DELHI MARKET RATES AS ON JANUARY 1, 1988)

Ammonia Bicarb (per 25 kg)	132.00	Boric acid Technical (per 50 kg)	1000.00
Mercury (per flask)	8,700.00	Paraffin wax (per 50 kg)	580.00
Soda ash (per bag)	255-290.00	Tartaric acid (per 50 kg)	7,450.00
Ammonium Chloride (per 50 kg.)	110-180.00	Borax Granular (per 50 kg)	560.00
Caustic Soda solid (per 50 kg)	395.00	Borax Crystal (per 50 kg)	560.00
Caustic Soda flakes (per 50 kg)	388-390.00	Sodium Nitrite (per 50 kg)	650.00
Citric acid (per 50 kg)	2,100-2,300.00	Sodium Nitrate (per 50 kg)	380.00
Stable Bleaching Powder Shriram (per 25 kg)	96.00	Camphor Thal (per kg)	93.00
Stable Bleaching Powder KCI (per 25 kg)	85.00	Camphor Powder (per kg.)	84.00
Stable Bleaching Powder MODI (per 25 kg)	92.00	Menthol Bold (per kg.)	175.00
Sod. Bicarbonate (per 50 kg)	250-255.00	Menthol flake (per kg)	158.00
Sod. Hydro Sulphite (per kg)	31-36.00	Menthol medium (per kg)	168.00
Rangolite (per kg)	40-60.00	Glycerine (per kg)	45-55.00
		Sodium Silicate (per quintal)	250.00
		Hexamine (per kg)	25.00
		Acetic Acid Glacial (per kg.)	14.50-18.00
		Copper Sulphate (per quintal)	1,900-2,200.00
		Formic acid (per kg)	29.00

DYES & COLOUR

Naphthol AS	
Naphthol ASG	
Naphthol ASBB	
Naphthol ASTR	
Naphthol ASOL	
Naphthol ASBO	

DIRECT DYES

Black E. Conc.	92.5
Diazo Black B.T.	
Green B.	
Blue 2-B	
Sky Blue FB	
Basic Auramine 'O' Conc.	50.0
Basic Rhodamine B. 500%	22.0
Basic Methylene Blue	9.3
Basic Violet	14.3
Basic Malachite Green	16.3
Acid Orange	4.5

ANNOUNCING

DYESTUFFS DIRECTORY

SECOND EDITION

Covering : DYESTUFFS
DYE INTERMEDIATES
TEXTILE AUXILIARIES
MACHINERY & EQUIPMENTS

- Plans are afoot to bring out the second revised and enlarged edition of the **DYESTUFFS DIRECTORY**.
- The voluminous Directory will focus attention on the status of the Dyestuffs and allied industries with up-to-date statistics.
- The Dyestuffs Directory will list out all the manufacturers, dealers, distributors, exporters of dyestuffs, dye intermediates, textile auxiliaries and chemicals with productwise classification. An exhaustive list of Indentors will be an added feature.
- A special section on Machinery & Equipments for the Industry is also being planned.

For details Please contact the publishers :

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MATERIALS IMPORTED

BOMBAY

(From 24-12-87 to 31-12-87)

(Cost of Imported Item is
CIF Value)

ACETATE DEHYDROXY: From France: Merind Ltd., 15 kgs., Rs. 3,67,979.

ACRYLIC ACID: From Germany: Hico Products Ltd., 7,800 kgs., Rs. 1,18,838.

ADHESIVE: From Japan: Par-ekh Marketing Pvt. Ltd., 42 kgs., Rs. 35,626.

ADIPIIC ACID: From UK: Nand Inds., Pune, 4,000 kgs., Rs. 59,393.

AMPICILLIN SODIUM STERILE: From Italy: Lupin Labs. Pvt. Ltd., 50 kgs., Rs. 68,431.

BETA HYDROXY ETHYL HYDRAZINE: From Holland: Almelo Chemicals, Hyderabad, 600 kgs., Rs. 61,966.

CAPROLACTONE DIOL: From USA: Chemisol Adhesives P. Ltd., 20 kgs., Rs. 1,737.

CHEMICALS: From UK: Hindustan Ciba Geigy Ltd., 5 kgs., Rs. 500.

CLOXACILLIN SODIUM STERILE: From Spain: Unichem Labs., 100 kgs., Rs. 1,36,862.

CYPROHEPTADINE: From Hungary: Themis Chemicals Ltd., 25 kgs., Rs. 51,646.

CYPROHEPTADINE HCL: From Switzerland: Tata Exports Ltd., 25 kgs., Rs. 51,087.

DIBUTYL TINOXIDE: From Japan: Lunebski Indl. Corpn., 2,040 kgs., Rs. 2,88,945.

DIMETHYL ACETATE: From W. Germany: J. K. Ltd., New Delhi, 59,280 kgs., Rs. 9,21,510.

ENZYMES: From Japan: Japle Sawyer Pvt. Ltd., 5 kgs., Rs. 1,39,104.

ETHYL GLYCOL: From India: Bharat Chemical & Products, Bulsar, 15,200 kgs., Rs. 1,53,079.

ETHYL THIOETHANOL: From Belgium: Chem-Pharma, 15 kgs., Rs. 34,858.

FRAMYCETIN SODIUM STERILE: From France: Pharma (I) Ltd., 15 kgs., Rs. 64,881.

GENTAMYCIN SULFATE: From Italy: Hemopharm, 15 kgs., Rs. 2,36,934.

HARMLESS CHEMICALS: From Netherlands: Nav Bharat Chemicals Ltd., Hyderabad, 15 kgs., Rs. 3,827.

ISOBUTYL BENZENE: From USA: Cheminor Distributors Ltd., 37,818 kgs., Rs. 12,00,000.

ISOPRENALONE SULFONATE: From UK: Burroughs Wellcome India Ltd., 75 kgs., Rs. 1,00,000.

L. BASE: From Hungary: Themis Agencies, Indore, 600 kgs., Rs. 3,21,498.

LABORATORY CHEMICALS: From USA: K. Raj & Sons, 15 kgs., Rs. 1,63,594.

LABORATORY REAGENTS: From USA: Pefco Inds., 15 kgs., Rs. 24,272.

LEVONITRO BASE: From India: Themis Agencies, 7 kgs., Rs. 4,48,838.

METHANOL: From India: of India Ltd., 2,50,000 kgs., Rs. 4,07,525.

OCTA METHYL CYCLOSILOXANE: From USA: Enterprises, 3,900 kgs., Rs. 1,33,441.

OLEYL CETYL ALCOHOL: From Germany: Hico Ltd., 6,800 kgs., Rs. 1,00,000.

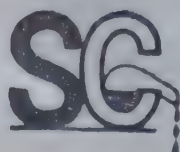


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OCTYL PHENOL: From Bakelite Hylam Ltd., Rs. 2,00,774.

XYLENE ACETIC ACID: K: Reliance Inds. Ltd., Rs. 13,421.

PROPYLENE: From Janavati Engg. Co. P. Ltd., Rs. 4,325.

VINYL ACETATE: From Bombay Dyeing & Mfg., 12 tons, Rs. 2,18,541.

VINYL ALCOHOL: From J.K. Cotton Spg. & Wvg., Kanpur, 4,000 kgs., Rs. Meghdoot Plastic Corp., kgs., Rs. 3,12,201; 7,000 Rs. 1,36,588.

RESEARCH CHEMICALS: UK: Pfizer Ltd., 1 kg., Rs.

SODIUM METHALLYL SULFATE: From Japan: J.K. Chemicals, New Delhi, 5,000 Rs. 1,89,272.

SOYA LECITHIN: From West Bengal: Hindustan Cocoa Products Ltd., NA kgs., Rs. 6,413.

SODIUM CRYSTALLINE SULFATE: From China: S. S. Labs P. Ltd., 5 kgs., Rs. 1,761.

TANTALUM NIOBIUM CARBIDE: From Thailand: Sandvik Ltd., Pune, 18,000 kgs., Rs. 1,761.

TEREPHTHALIC ACID: From Reliance Inds. Ltd., 2,00,000 Rs. 14,23,300; 2,00,000 Rs. 14,23,307.

TITANIUM DIOXIDE: From A: Coates of India Ltd., 1,000 Rs. 2,43,907.

TRIAMCINOLONE ACETAMIDE (MICRO): From Italy: Sarani Chemicals, Baroda, NA kgs., 2,26,485.

TRIPROLIDINE HCL: From Burroughs Wellcome (I), 50 kgs., Rs. 5,43,835.

TUNGSTEN CARBIDE: From West Germany: Sandvik Asia Ltd., Pune, 300 kgs., Rs. 82,831.

MADRAS
(From 10-11-87 to 13-11-87)
(Cost of Imported Item is CIF Value)

ALPHA OLEFIN SULPHONATE: From France: Chemicals & Plastics (I) Ltd., 36,000 kgs., Rs. 3,49,168.

ALPHA PHENYL GLYCINE BASE: From Singapore: T.T.N. Chemicals Ltd., Hyderabad, 1,000 kgs., Rs. 1,87,218.

AROMATIC CHEMICALS: From USA: Shalimar Agarbathi Co., Bangalore, 4,572 kgs., Rs. 94,451; Maschmeijer Aromatics (I) Ltd., 25 kgs., Rs. 9,584.

BENZOYL PEROXIDE: From Japan: India Nippon Electricals Ltd., Madras, Rs. 2,192.

CALCIUM CARBIDE: From Poland: Indian Oxygen Ltd., Calcutta, 1,50,000 kgs., Rs. 5,66,101.

CIMETIDINE: From Hungary: Kanpha Labs., Bangalore, 4,000 kgs., Rs. 2,94,383.

CYCLOHEXANONE: From FRG: Agrochemical Inds., Madras, 14,820 kgs., Rs. 2,02,497.

DESMODUR T 80: From Belgium: Biocon (I) P. Ltd., Rs. 1,65,429.

DIMETHYL AMINOETHYL: From France: South India Research Institute, Hyderabad, 5 kgs., Rs. 5,027.

DOPAMINE HCL/USP: From FRG: Pharma Research Analytical Labs., Madras, 20 kgs., Rs. 51,967.

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ETHYL ACRYLATE: From FRG: Aksol Chemicals, Ranipet, 18,130 kgs., Rs. 2,79,734. From FRG: Dinesh & Co., Ranipet, 18,130 kgs., Rs. 2,79,734.

ETHYL VANILLIN: From France: B. V. Aswathiah & Bros., Rs. 7,252.

FORMIC ACID: From UK: Malack Leathers, Madras, 20,720 kgs., Rs. 1,55,166.

GUM BENZOIN: From Singapore: Union Trading Co., Madras, Rs. 11,962; Rs. 10,990; Rs. 17,493.

HYDROXYLAMINE SULPHATE: From Japan: Senapathy Whitelay Ltd., Bangalore, 33,000 kgs., Rs. 8,03,681.

LABORATORY CHEMICALS: From Hong Kong: Hindustan Photo Film Mfg. Co., 2 kgs., Rs. 300.

POLYETHYLENE GRANULES: From Japan: Super Polytex Pvt. Ltd., Madurai, 14,000 kgs., Rs. 1,67,623.

POLYVINYL ALCOHOL: From Japan: Malack Leathers, Madras, 34 kgs., Rs. 7,02,389.

POLYVINYL ALCOHOL: From UK: D.C.W. Ltd., Bombay, 3,000 kgs., Rs. 1,34,613.

POTASSIUM CYANIDE ANALAR: From UK: HMT Ltd., 150 kgs., Rs. 27,644.

PYRIDINE: From Japan: Metro Exporters Pvt. Ltd., 4,485 kgs., Rs. 2,31,634.

SILICON CARBIDE CRUCIBLES: From UK: Sundaram Clayton Ltd., 455 kgs., Rs. 2,994.

SILICON OIL: From FRG: Kothari Electrochemical Inds. Ltd., 25 kgs., Rs. 11,653.

SYNTHETIC TANNING AGENT: From FRG: Aero Leather P. Ltd., Rs. 3,85,954.

TETRA HYDROFURAN: From Japan: Glindia Ltd., Bombay, 14,400 kgs., Rs. 4,59,239.

VANILLIN: From France: B. V. Aswathiah & Bros., Bangalore, 1,106 kgs., Rs. 1,46,341.

XYLIDINE: From Switzerland: Aromax Chemicals, Bangalore, 200 kgs., Rs. 13,664.

ZIRCONIUM SILICATE: Japan: Tamilnadu Ceram, 1,040 kgs., Rs. 23,448.

DRUGS MATERIALS IMPORTS

BOMBAY

(From 24-12-87 to 31-12-87)

(Cost of Imported Item is CIF Value)

BETA METHAZONE VALERATE: From Germany: Wallace Pharma Ltd., Goa, 1 kg., Rs. 61,975.

BULK DRUGS: From Holland: Duphar Interfran Ltd., 4 kgs., Rs. 3,01,097; From Switzerland: Wander Ltd., NA kgs., Rs. 1,18,694; From China: Laser Research Labs., 500 kgs., Rs. 3,13,692.

CARBAMAZEPINE IP: Switzerland: Korten Pharmacy, 1,000 kgs., Rs. 20,1

DIAZOTOIC ACID: From Pharmed Pvt. Ltd., 100 kgs., Rs. 45,190.

ERYTHROMYCIN THINATE: From USA: Dymacma, Vapi, 387 kgs., Rs. 2, Mehta Pharmed Ltd., 1,28 Rs. 10,15,392.

RANITIDINE HCL: Spain: Cadila Labs. Pvt. Ltd., 150 kgs., Rs. 3,35,788.

VITAMIN B6: From Germany: Abbott Labs. India, 100 kgs., Rs. 52,521.

New factory to make special enzymes

The Finnish company Alko Ltd. will commission a new factory for preparing special enzymes in January 1988. Manufacturing, which will take place in several fermentation units, is to be based on special versions of the Econase enzyme.

The Econase enzyme was developed jointly by Alko and the Technical Research Centre of Finland during the 1970s. The idea was to use the enzyme in the preparation of cheap alcohol from cellulose-based raw material, for ultimate use as motor fuel.

When it became apparent that alcohol would not become a competitive alternative to petrol for motor fuel in the foreseeable future, Alko's enzyme research turned towards the development of special versions of Econase for other purposes.

Many manufacturing processes now rely on these special ver-

sions, which are used for example in the production of animal feed and starch, tanning, brewing and baking, and also environmental oriented areas such as wastewater disposal. Enzymes have the advantage of ensuring purer and higher quality products whilst at the same time speeding up and simplifying biotechnical processes since Econase breaks down impurities often contained in raw material, thus increasing yield.

In addition, enzymes can be modified for special applications by reducing or increasing the level of side activity.

The new factory, will be built by Alko to manufacture special enzymes, for which there is a world-wide market.

An annual output of 5,000 tons of enzymes is forecasted, of which one-fifth will be used for the company's own production of alcohol.

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 BORIC ACID
 CALCIUM SULPHATE
 CALCIUM NITRATE
 COBALT SULPHATE
 COBALT NITRATE
 COPPER SULPHATE
 CITRIC ACID
 CREAM OF TARTAR
 CUPRIC CHLORIDE

DI. SOD. HYD. PHOSPHATE
 FERROUS SULPHATE
 FERRIC CHLORIDE
 GELATIN
 HYPO
 MAGNESIUM STEARATE
 MANGANESE CARBONATE
 MANGANESE SULPHATE
 MAGNESIUM CHLORIDE
 MAGNESIUM OXIDE
 MAGNESIUM SULPHATE
 MOLYBDIC ACID
 NICKEL SULPHATE
 OXALIC ACID
 POTASSIUM BROMIDE
 POTASSIUM NITRATE

POTASSIUM NITRITE
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 POTASSIUM IODIDE
 P.T.S.A.
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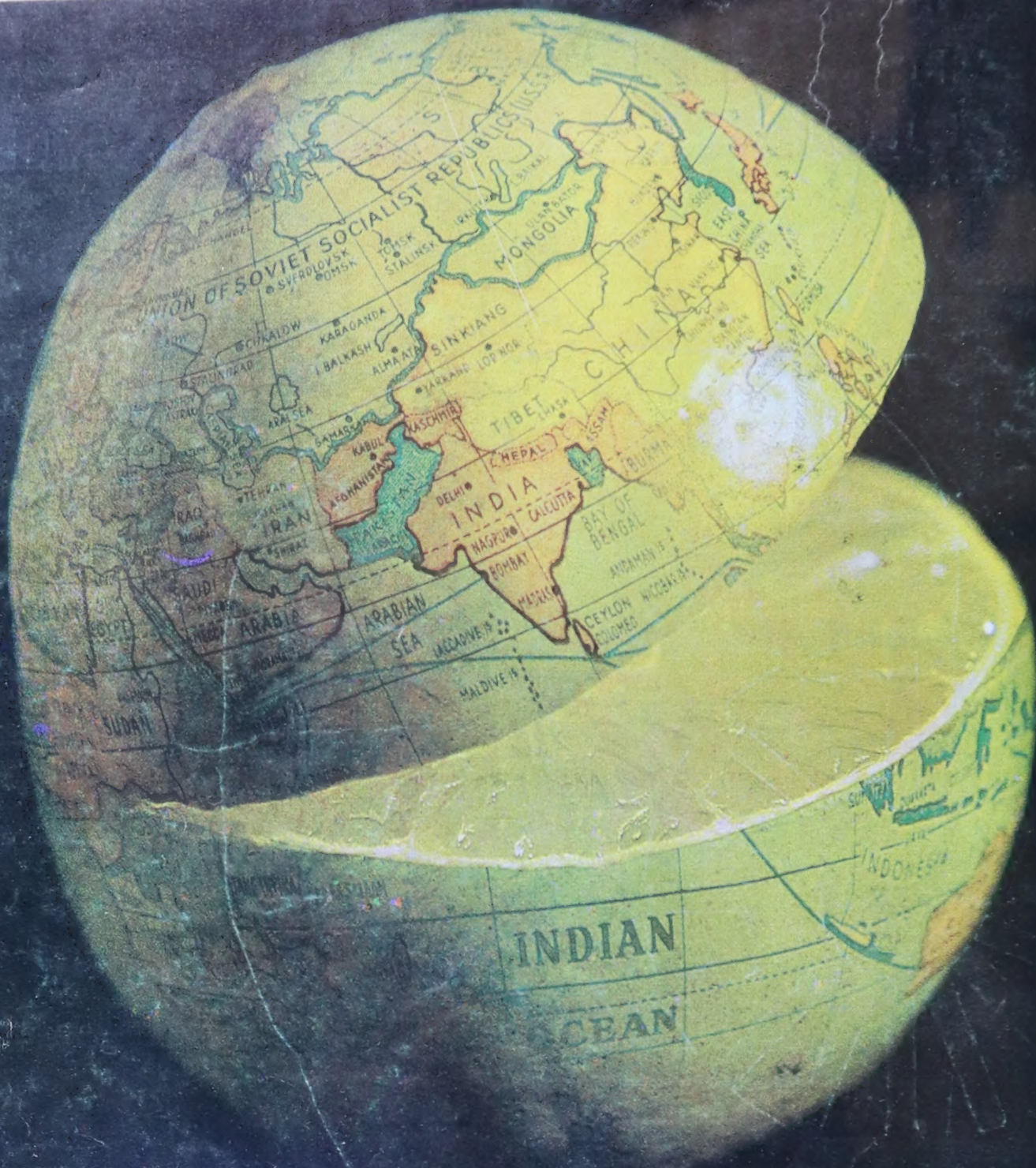
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